DOWNLOAD PDF DESCRIPTIVE, AND GRADE AND TONNAGE MODEL FOR GOLD-ANTIMONY DEPOSITS

Chapter 1 : Science Explorer

Descriptive, and grade and tonnage model for gold-antimony deposits.

Incomplete production and resource estimates. In addition to these errors Chung et al. A study of mercury deposits in California, in which the dates of discoveries were known, has shown that the largest deposits were discovered first. It follows from this that, for certain deposit types, if an area is incompletely explored, grade and tonnage curves may suggest a greater endowment than is actually present. However, this conclusion may not be universally accepted without thorough geological knowledge and a thorough history of exploration. There is an inherent bias in grade and tonnage data in that they represent only deposits that have been discovered and have been economically evaluated. Another bias in the creation of the data is that the information is knowledge and technology dependent. If the knowledge of the geology associated with a particular class of mineral deposits changes it may result in an amalgamation or a division of deposits. Other problems that create difficulty are: Grade and tonnage data that are not lognormal. Grade and tonnage data that have significant correlations. Most deposit models show little or no correlation between grade and tonnage see Figure 1. Grade and tonnage data where groups of deposits form clusters within a particular mineral deposit model. The standard deviation for log-transformed data exceeds a value of 1. The above criteria define standards for the creation of accurate and meaningful grade and tonnage data. The compilation and evaluation of the data attempt to meet all or most of these criteria. Once the data have been compiled, the evaluation of the actual grade and tonnage data requires several steps. An example given here is for calcalkalic porphyry copper deposits that occur in British Columbia. This deposit model is classified as Model L04 Lefebure et al. Table 1a summarizes the reserves data for the deposits used to characterize the grade and tonnage. The table is listed in increasing tonnage. Table 1b contains deposits that have been classified as calcalkalic porphyry copper deposits but do not fit well on the grade and tonnage curves. These deposits were excluded because the data provided for them were considered not to be a reasonable representation of the resource. Scatterplot matrix of calcalkalic porphyry copper deposits in British Columbia. Data are transformed to log base This diagram assists in evaluating the relationships of the data. There are no obvious relationships between tonnage and metal grades. The process of grade and tonnage curve construction involves the following steps: Plot the data are plotted as quantile-quantile plots q-q plots. Plot the data as pairs plots cf. Figure 1 to examine any possible associations or correlations. Calculate basic summary statistics on the data to check for non-normality log transform or high variances Figure 1 shows a scatterplot matrix of the grade and tonnage data. These data have been transformed to log base This plot is a graphically convenient way of examining interactions between the variables. In resource assessment procedures, the commodities and tonnages should be uncorrelated. The application of methods such as scatterplot matrices and regression methods can assist in testing the degree of correlation. From Figure 1 it can be seen that there is little or no correlation between any of the variables. This has been verified using regression methods. A discussion on the use of the lognormal model is given by Harris The correct interpretation of the curves is important in applying them to resource assessment. They are plotted as the log base 10 of grade or tonnage versus the proportion of curve Although the distribution of tonnage and grades for metal deposits is generally log normal, this is not necessarily the case for industrial minerals Singer and Orris, Grade and tonnage curves for British Columbia calcalkalic porphyry deposits. Individual deposits are shown a dots. The curved line represents a lognormal curve fitted to the mean and variance of the logtransformed data. The tie lines on each graph represent the values of the tonnage or grade at the 90th, 50th, and 10th percentile. The number of data points for each commodity is shown in the upper right of each figure. No distinction is made between production and reserve data. Figure 2 shows cumulative probability plots for the porphyry copper grade and tonnage data. Each plot shows the ordered tonnage or grade for each deposit as a point. A theoretical log-normal curve is also plotted on the graph. The curve is derived from the mean and variance of the sample data. Each curve also shows three tie lines at 90, 50 and 10 percentile levels of the curves. The grade or tonnage that is shown at the 50 percentile level indicates the average or mean grade or tonnage for that particular deposit type. The plots of Figure 3 show the log base 10 of tonnage or grade of the deposits plotted against the quantiles of a normal distribution. Such plots can reveal atypical deposits or an unexpected trend in the data. Quantitative procedures can also be applied to determine which transformation best fits the data. Figures 3a and b show quantile-quantile plots for both the raw data and the log-transformed tonnage data. In Figure 3a the four largest deposits appear as outliers. Even after applying a log transform to the tonnage data these four deposits are still noticeably large and possibly atypical. Also, in Figure 3b, there is a change in the slope of the curve where deposit tonnages exceed million tonnes. Such a change in slope suggests two distinct tonnage populations. The cause of these two populations is not clearly understood. Figures 3c and d show quantile-quantile plots for copper. In this case the distinction between the untransformed and transformed data is less obvious. On closer examination however, it can be seen that the log-transformed data provide a better fit in the quantile-quantile plot. The copper data also displays four outliers which represent copper values greater than 0. These data occur within the small to medium size deposits although there is no clear correlation between tonnage and copper grade as shown in Figure 1. The line of points in Figure 3d appears to be nearly a straight line. Further study is required to investigate the possible bimodal nature of the calcalkalic porphyry copper deposits. Quantile-quantile plots of British Columbia calcalkalic porphyry copper deposits.. Deposit tonnage and copper grades are displayed as raw untransformed data and as log-transformed values. The use of quantile-quantile plots graphically displays the distributional nature of the data. The tonnage data displayed in raw form a show a marked positive skewness. The log-transformed tonnage data b display characteristics that are more typical of a normally distributed set of data. Note the 4 outliers in b. The copper data show a small positive skewness in the raw state c. This skewness is absent in the log-transformed state d. Finally, summary statistics can be applied to provide some numerical description of the data. These descriptions are best interpreted with the plots as described in Figures 1, 2 and 3. Table 2 shows summary statistics for the grades and tonnages of the porphyry copper data.

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Chapter 2 : Grade and Tonnage for British Columbia Mineral Deposit Models

u.s. department of the interior u.s. geological survey descriptive, and grade and tonnage model for gold-antimony deposits by vladimir i. berger1.

Descriptive models for epithermal gold-silver deposits: Chapter Q in Mineral deposit models for resource assessment Epithermal gold-silver deposits are vein, stockwork, disseminated, and replacement deposits that are mined primarily for their gold and silver contents; some deposits also contain substantial resources of lead, zinc, copper, and or mercury. These deposits form in the uppermost parts of the crust, at depths less than about 1, meters below the This deposit type has had a controversial history in regards to genetic models. The major minerals are quartz, potassium feldspar, albite, and muscovite; typical accessory minerals include biotite, garnet, tourmaline, and apatite. The principal lithium ore minerals are spodumene, petalite, and lepidolite; cesium mostly Studies of the tectonic, sedimentary, and fluid evolution of modern and ancient sedimentary basins have also been used to select defining criteria Emsbo, Poul; Seal, Robert R. Chapter M in Mineral deposit model for resource assessment This report contains a descriptive model of sediment-hosted stratabound copper SSC deposits that supersedes the model of Cox and others This model is for use in assessments of mineral resource potential. SSC deposits are the second most important sources of copper in the world behind porphyry copper deposits. Around 20 percent of the Most of the remainder of the Ni production is derived from lateritic deposits, which form by weathering of ultramafic rocks in humid tropical Chapter L in Mineral deposit models for resource assessment This report provides a descriptive model of heavy-mineral sands, which are sedimentary deposits of dense minerals that accumulate with sand, silt, and clay in coastal environments, locally forming economic concentrations of the heavy minerals. This deposit type is the main source of titanium feedstock for the titanium dioxide TiO_2 pigments Van Gosen, Bradley S. Chapter J in Mineral deposit models for resource assessment Carbonatite and alkaline intrusive complexes, as well as their weathering products, are the primary sources of rare earth elements. A wide variety of other commodities have been exploited from carbonatites and alkaline igneous rocks including niobium, phosphate, titanium, vermiculite, barite, fluorite, copper, calcite, and zirconium. R, and McCafferty, A. Chapter K in Mineral Deposit Models for Resource Assessment This descriptive model for magmatic iron-titanium-oxide Fe-Ti-oxide deposits hosted by Proterozoic age massif-type anorthosite and related rock types presents their geological, mineralogical, geochemical, and geoenvironmental attributes. Although these Proterozoic rocks are found worldwide, the majority of known deposits are found within exposed Chapter G in Mineral deposit models for resource assessment Introduction This report is a revised model for a specific type of cobalt-copper-gold Co-Cu-Au deposit that will be evaluated in the next U. Emphasis is on providing an up-to-date deposit model that includes both geologic G of Mineral deposit models for resource assessment ver. These regolith deposits typically form within 26 degrees of the equator, although there are a few exceptions. They form in active continental margins and stable cratonic settings H of Mineral deposit models for resource assessment: The majority of copper produced in Africa comes from this region defined by the Neoproterozoic Katanga sedimentary basin of the southern Democratic Republic of the Congo DRC and northern Zambia. Copper in the CACB is mined from sediment Douglas; Denning, Paul D.