Quantitative Aspects in the Distribution of Base and Precious Metal Deposits of the World.

by

P e t r L á z n i č k a

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ABSTRACT.

Some aspects of the world-wide distribution of ore deposits of eleven base and precious metals (Au, Ag, Cu, Zn, Pb, Cr, Sn, W, Mo, Sb, Hg) are treated using quantitative data.

PART I. Metal density averages for various divisions of the earth's surface are derived and corrected, using the data of world metal content in ores compiled to include 1967/68, and the sizes of the territories in which the ores occur. Effective and ineffective areas in regard to the presence of ore deposits are distinguished and local effective metal density averages for continents and world principal structures are compared with world dry landmass effective density averages. Precambrian shields have the highest effective metal density of Cr and Au, Paleozoic belts of Zn, Cu, Pb and Hg and Meso-Cenozoic belts of Sn, Mo, Sb, W and Ag which is probably caused by progressive acidization of the earth's crust.

A concept of normative ore (i.e. ore with the world mean grade for each metal) is proposed as a measure of magnitude of ore deposits, districts and areas replacing dollar values. The geochemical index of accumulation results from relating quantities of ores to mean crust content of metals. Both relationships can be expressed by a formula and plotted diagramatically on a map. The results from this treatment of the data are used to discuss mineral belts of the American Cordillera and some areas with divergent symmetry.

Part II. The second part of the thesis consists of a topical manu-

al, describing the content, classification and coding of the computer processible University of Manitoba file of world base and precious metal deposits which has been the basis for the entire thesis work.

PART III is a bibliography,

PART IV are appendices.

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Introduction.

This thesis is an intermediate stage of the author's research, done at the University of Manitoba under the supervision of Dr. H. D. B. Wilson the purpose of which has been to use quantitative, production and reserve data of a group of eleven base and precious metal deposits for regional metallogenetic considerations on the world scale.

The first stage of the research, finished in 1968 and presented in the author's M. Sc. thesis, was concerned with relationships of gold, silver, copper, lead and zinc deposit belts, especially with regard to the division lines of predominant metalizations, like Cu:Pb and Cu:Zn lines.

During the second stage a sound basis for quantitative considerations has been completed, in the form of a computer processible file of world deposits of gold, silver, copper, zinc, lead, chromium, tin, tungsten, molybdenum, antimony and mercury, consisting of approximately 4000 stations (deposits, districts and superior areas) and punched on approximately 20,000 cards of the I. B. M. standart format. Due to unexpected delays in the implementation of a program, originally developed at the University of Western Ontario by P. G. Sutterlin and J. de Plancke to the University of Manitoba computer, the file has not became operative during the time of this thesis work so the benefit of the full use of its content

has not yet been attained. Due to this, the use of quantitative data from the file in regional metallogeny is treated methodically on several examples in Part I instead of presenting the final results bearing on the world wide relationships of deposits of the eleven metals and the quantitative comparison of Canadian and world metallogenies as originally planned. Part II concerns methods of building mineral deposits files and with the contents of such files. The thesis serves at the same time as a guidebook and explanation for the University of Manitoba file of world base and precious metal deposits, briefly characterized in the paper of Laznicka and Wilson (1970, in press).

In the third, post-doctorate stage, it is hoped the same considerations given in this thesis to local areas and to selected subjects will be considered more fully on the world wide scale.

The cardinal problem with which the writer has been confronted during the work was the presentation of the data and information related to mineral deposits and their geology, to the computer. Written word gives geologists freedom to express their thoughts, list exceptions, quote sources, ideas and examples, label their statements with "perhaps", "possibly", "according to", arrange the length of an article according to the complexity of a problem and they can avoid touching problems for which there is no answer. Moreover, an average geological paper is a mixture of geologist's observations and subjective interpretations and very often mere