A new CGMW map released:

The International Metallogenic Map of Africa at a scale of 1:5 000 000

The *International Metallogenic Map of Africa* (Figure 1), at a scale of 1:5 000 000 was prepared by the Council for Geoscience, South Africa, under the auspices of the Commission for the Geological Map of the World (CGMW) with support from UNESCO. The map was published by the CGMW and the Council for Geoscience in 2002.

The map supersedes an earlier version of the *International Mineral Deposit Map of Africa* (Sheet 1), produced in 1991. It was predominantly compiled by a team of 5 members, led by Dr. Erik Hammerbeck, Milica Veselinovic-Williams and Susan Frost-Killian. Several co-authors and co-operators, including various research institutions and most of the African and Middle Eastern Geological Surveys, as well as the Bureau de Recherches Géologiques et Minières (BRGM, French Geological Survey), assisted with the compilation and verification of the mineral deposit and background geological data.

Introduction

Work on the map started in 1975, coordinated by Prof. P.A. Routhier of Paris. In 1975, using various data compiled by the various African Geological Surveys and other available information, A. Blanchot, of the BRGM, compiled an experimental base map. Although remarkably accurate, the map needed significant modification to satisfy scientific and practical criteria.

Dr. A. Emberger, also of the BRGM, succeeded Prof. P.A. Routhier as General Coordinator of the project in 1978. He proposed a legend for the *Mineral Deposits Map of Africa*, the principles of which were adopted in 1980 in Paris. At this time, the details regarding contributions from the various geological surveys were also adopted. Progress on the map was slow after 1980, mainly due to financial constraints and difficulties experienced in gathering data. Prior to Dr. A. Emberger's retirement in 1991, most data had been collected and Sheet 1 of the *International Mineral Deposits Map of Africa* was published.

Dr. E.C.I. Hammerbeck succeeded Dr. A. Emberger as the General Coordinator of the *International Mineral Deposits Map* in 1992 and in 1994, compilation on the subequatorial African section of the map began, with Ms. M. Veselinovic-Williams as main author. In 1998, Dr. Erik Hammerbeck was elected as President of the Subcommittee for Metallogenic Maps. In the meantime, Dr. Hammerbeck was appointed President of the CGMW Subcommittee for Metallogenic Maps.

Characteristics of the Map

The 1:5 000 000 *International Metallogenic Map of Africa* is a wall map comprising four sheets, including the legend, with an overall size of 172 cm × 222 cm when mounted. The map covers the African continent, Madagascar and other islands, parts of the Arabian Peninsular, and parts of southern Europe. The projection is transverse mercator and the legend is dual French/English. Explanatory notes are being compiled and will be released on CD-ROM. Due to the scale of the map, it has been decided to make the information searchable using a simple querying interface. Areas with significant mineralisation and/or of metallogenic importance have been highlighted in 19 insets at a scale of 1:1 500 000.

The map is unique in that it depicts the mineral deposit distribution for the entire African continent and surrounding areas. It is an important tool for future mineral exploration in Africa as it provides a basis for the evaluation of the continent's mineral wealth. Various types of mineralisation, as well as regional mineralisation trends, can be identified. The compilation of the map has resulted in the creation of a mineral deposits database, which currently has more than 13 000 mineral data records. It is hoped that the compilation will stimulate research, exploration and mining in Africa and assist towards increasing expertise in the metallogeny of Africa (Veselinovic-Williams, M. and Hammerbeck, E.C.I.).

When the Council for Geoscience took over the compilation of the map, it was decided that it would be compiled digitally using ArcInfo® Geographic Information System (GIS) software. The database model consists of several data layers including geological and mineral deposit information, and topographic and limited cadastral information.

The map depicts the more important mineral deposits within their chronostratigraphic and geotectonic context (Veselinovic-Williams, M. and Hammerbeck, E.C.I., 1995). The more essential characteristics of the mineral deposits, including the commodity type(s), shape, size, orientation and the names of the more important deposits are represented. The mineral deposits are numbered and referenced according to a 5° latitude × 5° longitude grid.

The background geology, based on the *International Geological Map of Africa*, 1:5 000 000, (1985–1990), was up-dated where applicable. It depicts the chronostratigraphic succession of sedimentary and volcanic sequences and intrusive magmatic bodies, together with the orogenic domains, and distinguishes between the lithology of magmatic and metamorphic rocks (CGWM website).

The map was prepared in three phases:

1. Standardised tables were completed by the various African Geological Surveys, together with plots of the mineral deposits on stable base material, at a scale of 1:5 000 000 (Veselinovic-Williams, M. and Hammerbeck, E.C.I., 1995).
2. Specialists at the Council for Geoscience studied, compiled and captured information on the mineral deposits in the Africa Mineral Database, designed and created specifically for the GIS map compilation. The background geology, based on the *International Geological Map of Africa*, 1:5 000 000, (CGMW/UNESCO, 1985–1990), was up-dated where applicable, in accordance with the legend devised by Dr. A. Emberger. It depicts the chronostratigraphic succession of sedimentary and volcanic sequences and intrusive magmatic bodies, together with the orogenic domains, and distinguishes between the lithology of magmatic and metamorphic rocks (CGWM website).
3. Publication of the map on behalf of the CGMW and UNESCO.

While the depth of the data available on the individual deposits is limited by the scale of the map, the strength of the digital data lies in the GIS model which was designed to facilitate comprehensive metallogenic analysis. In 1999, the digital data for subequatorial Africa was released on CD-ROM and a separate comprehensive, interactive, searchable digital version for the entire map will be released on CD-ROM in due course.

Principles of the legend

In 1981, the following principles for the legend for the *International Mineral Deposits Map of Africa* were established by Dr. A. Emberger (Emberger, A., 1981):

- The map should be factual, with minimal interpretation;
- The amount of information on the map should be in accordance with the scale to prevent "overloading" the map;
- The map should be clear and pleasant to read and should show the mineralized zones as defined by mineral deposits and their geotectonic environment;
- The tectono-geological background must portray the metallogenic environment.

From its inception, the aim has been for the map to be as factual as possible, leaving interpretation to the end users. The amount of information shown on the map is limited by the scale and therefore, decisions on which deposits to include on the map were made using the criteria of economic potential of the orebodies (regardless of the status of mining) and/or the metallogenic significance of the deposit

- The name and/or reference number of the deposit;
- The predominant commodity(ies) contained, shown by chemical or mineral symbols(s) and colour;
- The shape and orientation of the deposits, indicated by an appropriate symbol;
- The size of the deposit, indicated by a circle of varying diameter around the symbol according to a commodity-based scale (Figure 2).

Figure 2 Mineral deposit data as depicted on the map.

The background geology is based on chronostratigraphy subdivisions of the 1:5 000 000 CGMW *Geological Map of Africa* emphasizing the following features (Veselinovic-Williams and Hammerbeck, 1995):

- The age of the rocks shown in pale colours and symbols;
- Orogenic, anorogenic and platform environments, represented by different appearances of the age symbols;
- Sedimentary basins, shown by hatchings superimposed over the background colour;
- Magmatic and volcanic rocks, represented by hatchings in colour, based on the chemical composition of the rock; and
- Intense tectonic overprinting shown in hatchings in the colour of the youngest orogeny superimposed over the background colour.

To order

The distributors of the Map are the CGMW and the Council for Geoscience. The retail price of the map is EUR 60 or US\$ 60 (or SA Rand equivalent at current exchange rate). The contacts for ordering the map are:

- www.cgmw.org or cgmw@club-internet.fr; or
- thelmas@geoscience.org.za or
- juanitaw@geoscience.org.za.

References:

- CGMW, 1982. The metallogenic map of Africa at 1/5 000 000. International cooperation project, BRGM, Orleans, France, 16pp.
- CGMW/UNESCO, 1985-1990. International Geological Map of Africa at 1:5 000 000. CGMW/UNESCO, Paris.
- Emberger, A., 1981. International Metallogenic Map of Africa at the scale of 1/5 000 000. Unpublished paper, CGMW, 23pp.
- Veselinovic-Williams, M. and Hammerbeck, E.C.I., 1995. The International Mineral Deposits Map of Africa (1:5 000 000) - A Progress Report. Extended Abstract - Proceedings / GSA '95 International Conference, Nairobi, pp. 709-718.