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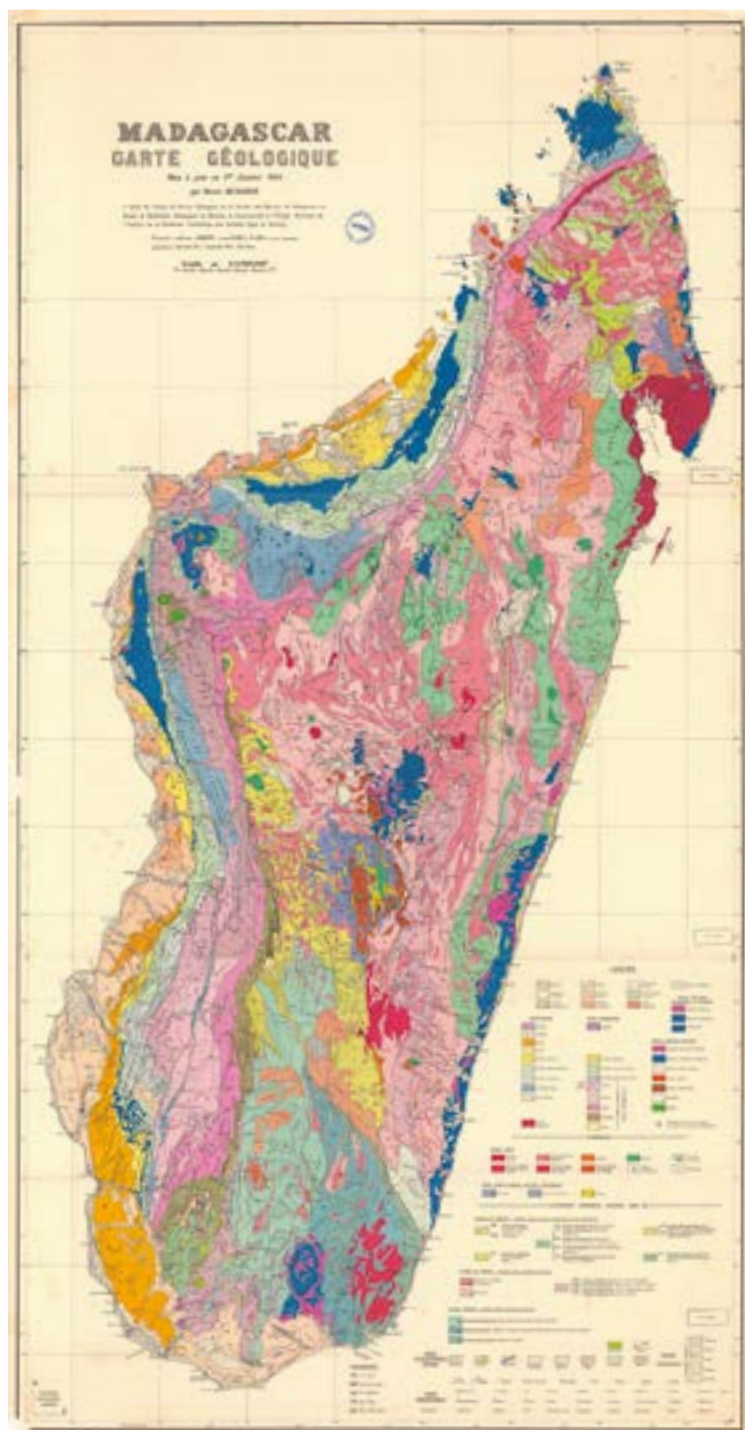
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Promoting the documentary heritage in the digital age: the BRGM's experience in Africa

Geoscience knowledge in Africa, compiled and produced by BRGM for over a century, initially indispensable for exploring the continent's natural resources, is likewise being exploited today under programs aimed at reinforcing the geological and mining infrastructures of African nations. Competencies in documentary engineering developed by BRGM, both for managing and enhancing the value of its own resource and for use during the projects conducted, is made available on a regular basis to its African partners.

With over 170,000 documents collected, BRGM's Earth Sciences library occupies a prominent position in Europe among resource centers regarding knowledge in geology, mining and the environment. Its documentary resource comprises both public literature indispensable for maintaining the in-depth knowledge of its engineers and research personnel (30,000 books, 13,000 theses, 5000 conference proceedings and 5000 titles of periodicals) as well as in-house publications (60,000 reports, 33,000 technical documents, as well as 20,000 maps).

Unrivalled geographical coverage of Africa

BRGM's library holds over a century's worth of data on Africa (figure 1), the fruit of the long history of an establishment created in 1959 and built upon the foundation

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of knowledge of its predecessors that were the overseas mining services: BUMIFOM (the mining bureau of French overseas territories, *photo 1*), the French West African (AOF) federal directorate of Mines and Geology (Dakar), that of French Equatorial Africa (AEF - Brazzaville), the BRMA (the Algerian Bureau of mining research), etc. The information available on the subsurface, hydrogeology and African mining resources today amounts to 10% of BRGM's library collection (9000 reports and 6000 maps, *figure 2*).

Because the economic, environmental and land-use planning stakes require access to precise and complete knowledge of the geological formations, BRGM's experience and competencies in information management have, for a number of decades, been made available to African governments (Ministries of mines and geology, of hydraulics, of the environment, etc.) under bilateral and multilateral programs of cooperation and development assistance.

The PANGIS initiative (Panafrican network for a Geological Information System), supported by UNESCO and developed, within BRGM, by the CIFEG foundation (International Center for Geological Training and Exchanges) was formed in the 1990's and federated up to 30 African geological surveys instructed in the management of their libraries. It contributed to raising awareness among member countries as to the need to re-appropriate useful information, in order to manage it better and to have it available both for their own development and planning (concerning water supply, for example) and to attract investors, while at the same time continuing to govern their natural resources.

Consecutive to this, between 2003 and 2006, the GIS-Africa project was funded by the French Ministry of Foreign Affairs. It was a precursor of the AEGOS project (*African-European Georesources Observation System*) financed by the European Commission, which took place between 2008 and 2011. The ambitious PanAfGeo project is the continuation of these actions (*cf. article Guillaneau et al., this issue*). These networking initiatives all represent

FIGURE 2
Geological map of the Republic of Madagascar at 1:1,000,000 scale (Roig *et al.*, 2012).

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milestones and development projects to help reinforce infrastructures and contribute to national and regional appropriation of geo-scientific documentary heritages.

Tools and digital resources to promote knowledge dissemination

BRGM's documentary services quickly realized the advantage that could be derived, notably in Africa, from new information and communication technologies (NTIC). They tested, selected and contributed to developing various integrated library management systems in order to implement a chain of document treatment satisfying present-day requirements (managing scientific production, digitization, search engines, full-text dissemination portals, etc.).

FIGURE 1
Geological map of Madagascar at 1:1,000,000 scale (H. Besairie, 1964).
© MADAGASCAR GEOLOGICAL SERVICE (TANANARIVE)

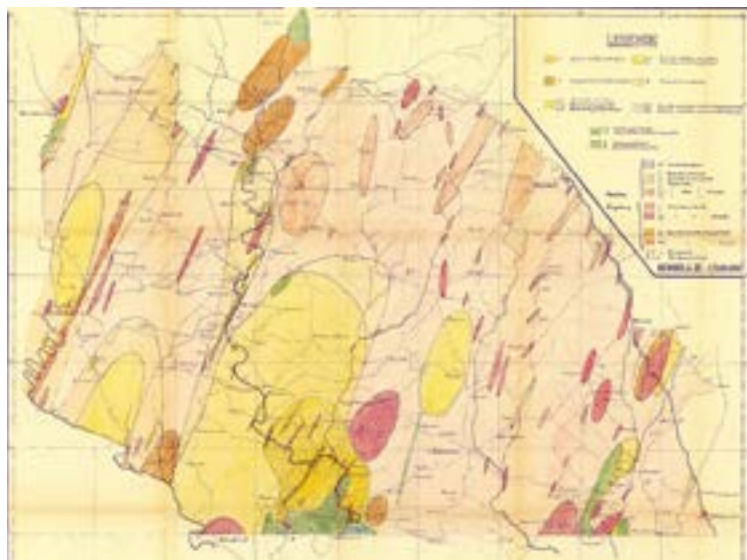
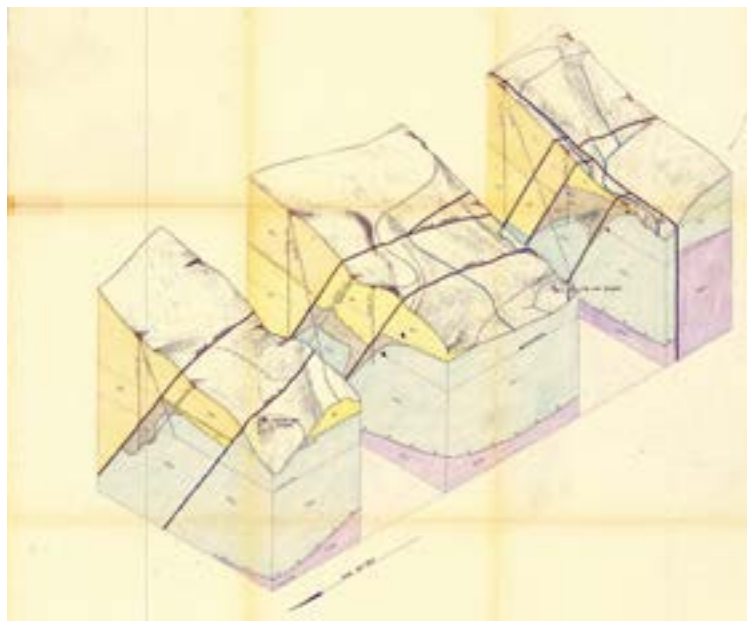
PHOTO 1
BUMIFOM headquarters, Tananarive, Madagascar, 1950. © BRGM

To bring this primary material to a wider audience, the BRGM, over ten years ago, launched its digital revolution to ensure that this knowledge base would be made available to the public in readily accessible formats and *via* interoperable portals. Thus, to date, over 46,000 documents (figures 3 and 4) have been digitized, and more than half

the studies, when they are open to the public, have been made available on BRGM's portal: <http://infoterre.brgm.fr>.

By virtue of its experience and its perfect mastery of the existing tools, which it contributed to improving and adapting, BRGM offers proven document engineering solutions. These aim at reinforcing and modernizing document infrastructures, professionalizing personnel in the countries requesting it and, lastly, mobilizing these latter concerning the need to take documentation into account in large-scale geographic, geological, mining information systems and in the management of mining licences or cadasters.

FIGURE 3 / Block diagram of a mining project (copper) in Lagotala district (Mindouli, Congo-Brazzaville). © BRGM, 1956



Sharing know-how, mutualizing knowledge, training

To reconstruct geological and mining data heritages on a national scale, BRGM's actions aim to:

- offer practical solutions to achieve the compliance of premises and equipment necessary for the proper operation of documentary activities;
- install integrated library management systems (whether physical or digital);
- enrich existing library holdings and protect the heritage through selective digital reconstitution of documents of varied origins: ministries and other administrations, mining companies, technical consultants;
- install an Electronic Document Management system (EDM), facilitating access to the primary document in "full-text";
- enable selective search and dissemination of information and the development of catalogues and web portals thanks to New Information and Communication Technologies (NTIC).

In all its projects abroad, BRGM includes a "training and technology transfer" component to reinforce the capabilities of its partners and clients. According to needs, this may take on a variety of forms including:

- training *via* mentoring throughout the time the projects are being carried out;
- targeted training, concerning the use of software and documentary applications;
- training courses in the library of BRGM's Scientific and Technical Center in Orléans, for an initiation into the various technologies and methodologies liable to be implemented in the projects.

FIGURE 4 / 1:200,000 geological map of Mankono Bouaflé Tiebissou Bouaké, Ivory Coast (L. Bouige, 1934).

► ASSISTANCE TO NIGER'S MINISTRY OF MINES AND ENERGY FOR SETTING UP A GEOLOGICAL AND MINING INFORMATION SYSTEM



Adoption of the technical equipment by the SIGM personnel.

© BRGM, 2009

Under the European Union's Program to Strengthen and Diversify Niger's Mining Industry (PRDSM), which aims to provide the country with geological infrastructures that would allow it to promote its mining potential, BRGM, in 2007, was assigned the task of setting up a geological and mining information system (SIGM) at the Ministry of Mines and Energy (MME). In order to promote the development of a GIS, one segment of the project was devoted to reconstituting the geological and mining documentary heritage and setting up a new documentation center.

An overview of the measures accomplished

- Reconstitution of the documentary heritage and renovation of the dedicated space:
 - search for records concerning mining titles (digitization of the orders relative to mining exploration permits) and their geographic extent;

- supplying 240 digital documents produced by BRGM concerning the territory of Niger (reports and maps);
- creation, on the Ministry premises, of a space for consultation.
- Installing an application for the inventory and description of library holdings: the information system integrates a tool

specifically dedicated to these functions. This makes it possible both to have access to specific links between a GIS object (a borehole, for instance) and the documents associated with it, but also a search for information throughout the GIS.

- Implementation of organizational and methodological recommendations:

- development of a working method for managing the scientific and technical information of the SIGM, with acquisition, digitization, cataloguing and indexing, arrangement of the resources, reception of the public, etc;

- establishment of a procedures manual presenting a complete panorama of document management.

- Training:

- training in information management at BRGM's Scientific and Technical Center in Orléans;

- training in administration and maintenance of a geological information system;

- specific training on indexing applied to the geosciences;

- support by mentoring of the ministry agents for six months. —



Rehabilitation of the former ONAREM library between 2007 and 2010.

© BRGM, 2010

BOX 2

► SETTING UP A DOCUMENTARY INFORMATION SYSTEM AT THE REPUBLIC OF CONGO'S MINISTRY OF MINES AND GEOLOGY



Under a governmental strategy for the country's economic and social development, notably stressing its mining potential, the Brazilian firm Asperbras, acting on behalf of the Congolese government, asked BRGM to assist the Ministry of Mines and to provide it with an information system enabling it to collect and subsequently disseminate the state of geoscientific knowledge relative to its territory. The establishment of such a system between 2014 and 2015 aimed to attract new operators and investments, and likewise to promote the updating and/or the emergence of new knowledge.

An overview of the measures accomplished

- Reconstitution and enrichment of the documentary heritage including the delivery of more than 500 digital reports and

maps produced by BRGM concerning the Congo's national territory;

- Implementation of a documentary information system;
 - installation of the free PMB SIGB including the digital files of the reports and maps (accompanied by their leaflets) and the IUGS multilingual thesaurus (International Union of Geological Sciences) to provide the reference vocabulary in the indexation;
 - development of the Intranet portal for the Ministry's Documentation Center.
- Transfer of competencies:
 - training in information management through immersion at BRGM's Scientific

and Technical Centre in Orléans, for three mission heads from the ministry;

- training in Brazzaville of three Congolese computer specialists in administration and maintenance of its documentary information system;
- training in Brazzaville of four librarians in documentary techniques, in adopting the PMB tool and the local implementation of a documentary processing chain. —

Intranet portal "Information Resources of the Ministry of Mines and Geology of the Republic of Congo" as a final product of the project (November 2014).

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Documentary techniques (cataloging, indexing, etc.), the use of an appropriate management system, the practice of scanning documents and managing digital files are the main orientations of the training sessions on offer.

Immersion in a European documentary structure, confronting professional practices, and conducting a review of the current problematics of new information technologies enable trainees to gain an understanding of and acquire the means for implementing a documentary strategy in their own institutions (information workflow, organizing

collections, the value of geoscientific information, document communicability policy, pricing of services, etc.)

So-called "free" technical solutions and a configuration adapted to the field of the geosciences

The rapid rise of "open source" technologies over recent years has resulted in the creation of several integrated library management systems (ILMS). These applications on the Internet, accessible via simple navigators, enable for a

FIGURE 5 / 1:200,000 geological map, Brazzaville sheet, Pointe Noire, Republic of Congo (Babet et Chochine, 1952). © BRGM



reasonable price and with no judicial constraints (CecILL-type open source licence) nor dependence upon editors of software solutions, the automation of library functions, thereby satisfying management and dissemination needs, whether digital or on paper, of documentation professionals.

They rely on the use of computer technologies that, though recent, are proven and can be mastered readily and intuitively. They likewise offer considerable installation flexibility, adapting to a single-station context, as well as to a network, an intranet Online Public Access Catalog (OPAC), or a portal for Internet dissemination. The whole can be appropriated and utilized with no in-depth understanding of computer science. Moreover, these tools benefit from a dynamic and supportive user community, who willingly offer support to new users.

In this framework, the BRGM has opted to use the PMB tool (Pour Ma Bibliothèque) to manage its own library resources. It henceforth recommends it to its partners and clients. It deploys the software and makes available a configuration to users that is suited to their thematic (geoscientific glossaries) and geographic scope, thereby offering ready-to-use solutions. When it is called on to reconstitute a documentary collection out of its own production, it supplies its client with an integrated digital library of bibliographical records and digitized documents. Being interoperable, PMB can interface with GIS-type tools

“BRGM offers simple and efficient solutions to promote the documentary heritage of its African partners”

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when it is integrated into a geological and mining information system.

After over 50 years of existence, and based on a century of preserved and archived documentation (figure 5), BRGM is entering the 21st century with the will to develop and share its documentary heritage as a whole, particularly via digital tools. Its broad-based and long-term experience in the whole of the African continent is a guarantee for the pursuit of fruitful collaborations with the African geoscientific community. ●