The economy and future development of Mauritania depends critically on its mineral resources. **Peter Pitfield** describes how international investment in mineral exploration is being encouraged.

Mapping Mauritania's desert

The BGS has carried out three commissioned geological mapping projects in Mauritania over the past three and a half years. The largest and most comprehensive programme was a World Bank-funded contract covering the southern half of the country. Two smaller programmes have been undertaken in north Mauritania: one as subcontractor to International Mining Consultants to map the Sfariat–Ouassat district for an EU-funded gold exploration programme and the other an extension to the southern Mauritania project to map the area extending from the Zouerat iron mining district to the Guelb er Richat dome.

The Islamic Republic of Mauritania is located in the westernmost part of the Sahara. Mining is one of the mainstays of the Mauritanian economy and accounts for a large part of its foreign exchange earnings. Iron ore production (about 12 Mt per year) from Zouerat in the north-central part of the country contributes about 50% of Mauritanian exports and 12% of its GDP. The Mauritanian government looks to exploitation of other mineral resources to underpin further development.

The objectives of the southern Mauritania project included:

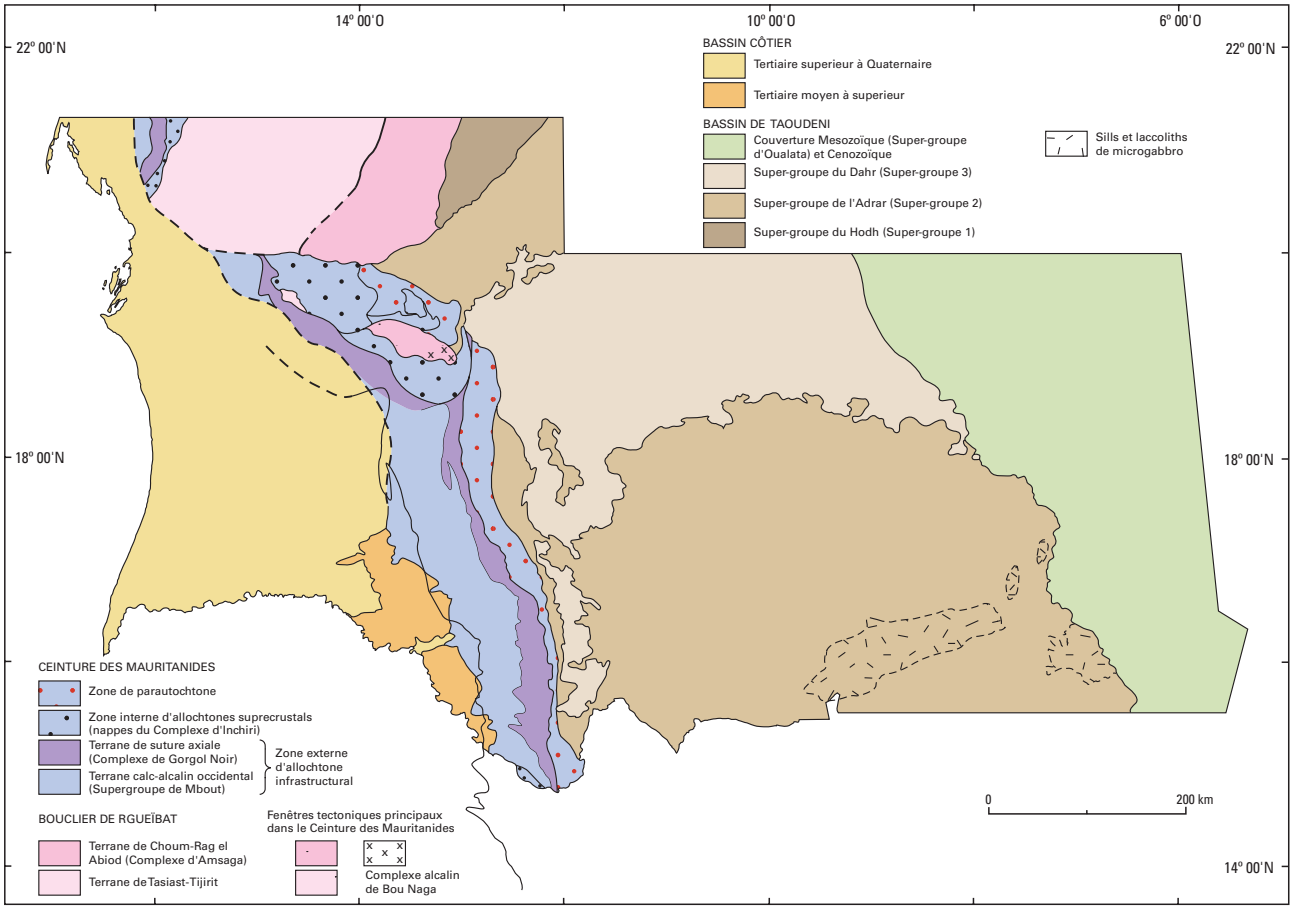
- Collation of all the geological and minerals-related information on the southern half of Mauritania and production of a new series of geological and metallogenic maps using up-to-date methods.
- Establishment of a computer laboratory and Arcview GIS to store, safeguard and provide ready access to all the relevant national geoscience and minerals information.
- Evaluation of the mineral potential of the country; this included a geochemical exploration sampling programme and studies of the main ore deposit types.
- Training Mauritanian personnel in geological mapping techniques and use of the IT packages.
- Creation of a website for the Ministry of Mines and Industry in order to promote investment in developing the mineral resources of Mauritania.

The project area mostly comprises vast plains (part of the African plain) with elevated central plateaux ranging in height from 200 to 800 metres. Three quarters of Mauritania and half the project area is covered by the Sahara desert; the remainder, comprising a strip up to 200 kilometres wide along the southern border zone, belongs to the Sahelian zone which supports some agriculture. Broad north-east-trending active dune belts transect the coastal plains and the Saharan zone of the eastern sector is covered by immense sand seas.

Geologically, the southern Mauritania project area is located on the western edge of the West African craton: an area of Precambrian rocks which has largely remained unaffected by orogenic events since 1700 Ma. The main tectonic domains that are represented include:

- The Reguibat shield, an uplifted part of the Archaean cratonic basement that crops out over a large area of northern Mauritania and the neighbouring countries.
- The Taoudeni Basin sedimentary sequence which covers over half the craton.
- The polyorogenic Mauritanide belt which bounds the western margin of the craton.
- The Senegalo–Mauritanian coastal basin.

Typical rugged, hilly terrain in southern Mauritania.



Geology of the BGS project area, southern Mauritania.

An initial compilation phase involved collation of all known data (maps, reports, papers, monographs and theses). Areas of more complex geology that required revision and/or areas of high mineral potential were selected for the 12 geological mapping sheets. Map revision focused upon updating the lithostratigraphy, structure and age relationships as well as upgrading the level of information on the nature and disposition of rock types.

On the whole, deserts are relatively easy places to carry out geological mapping. Geological features can be more easily discerned in desert landscapes and off-road vehicle access is relatively easy except in areas of active dune belts and sand seas. The most difficult and potentially damaging terrain to traverse was the incised rocky plateaux, especially where veiled by blown sand.

Rapid, but systematic, geological mapping of such a large area relied heavily upon the satellite imagery coverage and locally available pre-existing aerogeophysical and geological information. Vehicle-based geotraverses were planned to ground-truth the initial image-based compilation and at the same time maximise the amount of useful lithological and structural information that could be obtained. Existing routes, supply bases and water sources as well as co-ordination and mutual support of the exploration geochemical sampling programme were major considerations in the overall logistics. Health and safety for all field personnel was of paramount importance in this hyperarid environment.

Systematic geological mapping and sampling were carried out in three campaigns of two to three months duration during 2002/03 with the objective of completing four quadrangles per campaign. Mapping geologists spent 6–8 weeks of field time in each phase. Specialists in basin stratigraphy, ore deposit geology and structural geology joined the mapping teams for short periods.

Exploration geochemical sampling was carried out concurrently with the geological mapping under the supervision of the BGS mapping geologists, economic geologist and geochemist. Sampling focused upon those areas identified as having mineral potential either from known deposits and mineral occurrences, geochemical anomalies identified in previous exploration programmes, zones with favourable lithological and structural settings and at the broadest level, permissive terrains.

As a result of the work carried out by the BGS during the Southern Mauritania project a significant contribution has been made in the understanding of the geology. This is presented in a comprehensive two-volume report that accompanies the series of geological and metallogenic maps and GIS-linked databases.

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