

an unprecedented opportunity for African earth scientists and their counterparts from other parts of the world to interact and exchange scientific information, particularly during the first year of the International decade for Natural Disaster Reduction. Strongly Recommends that similar assemblies be held in Africa at regular intervals.

7. Participants, recognizing the remarkable success of this Assembly, express their profound thanks and gratitude to the Government of Kenya for hosting the meeting, and Congratulate the Local Organizing Committee and co-workers for the excellent preparations, the superb scientific programme, the magnificent facilities provided and for all those efforts which resulted in a very high level of scientific exchange.

15th COLLOQUIUM ON AFRICAN GEOLOGY, 10-13 Sept. 1990, Nancy, France.

R.M. Schmid

The colloquium started with the inaugural session introducing geological and tectonic maps of Africa. Conference invitees e.g. Prof. Unrug presented their papers.

The talks covered topics such as rare and noble metals, Pan African metallogenesis, crustal growth, continental sediments, and the Lake Nyos disaster. During lunch breaks, poster sessions on Pan african, geophysics, crustal growth, continental sediments, metallogenesis, sedimentary basins, and crustal growth were scheduled.

The organisers of this colloquium on African Geology can

be complemented to have attracted a considerable number of researchers from Africa.

The abstract volume can be consulted at the University of Zambia, School of Mines c/o Editor.

Two expanded abstracts are presented here.

Silicate Karst in eastern Niger - A Geomorphological study

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Integrated into a research project concerning the paleoclimatic and paleogeographic conditions of the southern Sahara and the northern Sahel, than is undertaken at the University of Würzburg/Germany and supported by the deutsche Forschungsgemeinschaft, karst features developed in silicate rocks such as quartzitic sandstones, silcretes, ferricretes and crystalline rocks were studied in the eastern part of the Republic of Niger.

On the basis of micromorphological analyses it is confirmed that the formation of those features is indeed caused by rock solution by circulation groundwater in the karst systems (Sponholz, 1989).

Among the study regions the most karstified are the southwestern part of the Djado-Plateau and the southern part of the Cuesta of Bilma, where the karst volume is up to 3%. Also the central and the southern part of the Termit Massif and the Routous Massif are intensively karstified - in the case of the Termit the iron-rich sediments of the Continental Terminal are the most affected.

In all the studied karst areas there exist features of vadose and of phreatic karst - the details of solution forms being exactly the same as they are known from carbonate karst. There are caves and subterranean gallery systems - the longest reaching 40 to 50 meters of accessible length and common heights of cave rooms are between 6 and 20 meters. The caves may be connected by horizontal or vertical tunnels.

Most of the studied karst features are formed in vadose systems, the phreatic forms (most of them minor channels that are incised into the floor of the vadose caves) are of a later period of formation.

Concerning the dating of the karst there are no absolute data because of the lack of any identified contemporaneous deposits. So it is only possible to specify the early Tertiary to be the first period of intensive silica dissolution on the one hand - after the sedimentation of the sandstones of the Continental Intercalaire as the youngest intensively karstified sandstones - and the transition Pliocene/Quaternary as the end of the development of the present-day accessible karst forms on the other hand, when the present relief of cuestas and valleys was created ("Grand creusement postérieure au Continental Terminal", Faure, 1966; Busche, 1982). Thus the karst features presented here are only the dry, fossilized remains of formerly waterfilled, vadose systems. Nevertheless it must be supposed that karstification continued during the Quaternary and even during the Holocene in the groundwater saturated zone (pedological and hydrological analyses. (Baumhauer, 1986, Völkel, 1989)).

In any case the existence of the silicate karst must be considered to be a very important factor in the geomorphological history of the landscape - above all because of its influence on the hydrographic situation: Where subterranean karst is well developed, the superficial drainage pattern is extremely reduced. So the karstification of extended areas of the Saharan plateaus enables a certain influx even of the poor rainfall at present times (less than 20 mm/a at Bilma, influx verified by tritium content in groundwater). Surface depressions may be filled with fine grained, clastic materials which depending on the grain size of the infillings, favour either an influx or water stocking in the depressions and so are of importance for the vegetation pattern, too.

Similar silicate karst features - sometimes called "pseudokarst" because of nomenclatory differences - have recently been described from South Africa (Martini, 1987), Australia (Young, 1986) and Southern America (Pouyllau & Seurin, 1985), and are known also from other regions in western and central Africa.

Once the existence of karst in silicate rocks is accepted, these phenomena have to be taken into consideration for further prospecting of groundwater - above all in arid or semiarid regions without or with little recent recharge of the aquifers - and for any paleoclimatic or paleogeographic research.

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Pelitic sediments rich in clay minerals represent the most important mineral liners of waste deposits. As parameters like convection, diffusion, retention and sorption are mainly depending on the carbonate content and on the relative abundance of the different two- and three-layer phyllosilicates, a qualitative and quantitative identification as well as a chemical characterization of the clay-mineral association is of eminent importance for an evaluation of the chemical interaction between phyllosilicates and complex waste waters as well as of the horizontal and vertical long-term stability of mineral barriers.

In connection with the migration of heavy-metal solutions through marly claystones for example, most of the heavy-metal ions are immobilized by the formation of heavy-metal carbonates. Coincidentally, the calcite content decreases and heavy-metal oxichlorides are formed subsequently. Both processes are accompanied by the development of cracks in the mineral liner changing the barrier properties. The intensity, however, is depending on the varying sorption capacity of the different phyllosilicates within the clay-mineral association of the sealing system which, for instance is higher for smectites than for kaolinites.

In order to minimize the migration of natural and synthetic contaminants into the biosphere, clays and claystones, the chemism, mineralogy and soil physical property of which may be modified, meet three requirements in environmental geology:
1 geological barrier functions

CLAYEY BARRIERS AND LINERS IN ENVIRONMENTAL GEOLOGY