

TOWARDS A GEOSCIENTIFIC INFORMATION SYSTEM FOR ARCHIVING COLLIERY DATA

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In 1996 the «Information Centre on Underground Energy Resources» was founded within the former Energy Department of VITO. Soon after, this Centre became integrated within the newly created Raw Materials Centre of Expertise. The Information Centre was originally launched on the base of a specific need of the Flemish Government: to preserve the invaluable geological information related to the former underground coal mining activities. Indeed, due to the decline of the coal industry and the subsequent closure of the mines, data such as reserves and resource estimates and associated mining maps, were at risk of careless handling and disappearance. The preservation of this geological information is vital to the improvement of the efficiency and cost-effectiveness of all further economic and ecological activities related to coal-bearing formations. Flanders' deep subsurface still has very important mineable coal reserves, which are estimated at at least 5 billions of tons. Examples of alternative valorisation of coal-bearing strata and subsurface structures include: underground gasification of coal, extraction of methane gas from unmined coal seams (coalbed methane), storage of greenhouse gases (CO₂) in unmineable coal seams (so-called geological sequestration) and the reuse of abandoned underground infrastructures for the storage of waste products. The first objective of the Information Centre was the rescue of the coal mining geological data: in 1997 all of the original coal mining and geological archives were transferred from the former collieries to VITO and stored into a safe and appropriate location. The physical preservation of the coal mining archives is now guaranteed. Next, important and relevant data such as mining maps and borehole descriptions had to be archived and inventoried first before their processing into new and user's friendly information systems. The development and implementation of the latter geo-information systems is still in progress, but some applications are already operational. «GEKKO» (GEologie Kernboringen Kempische Ondergrond) is a new user's friendly database / information retrieval system for the storage and management of all geological information on coal-bearing rocks derived from detailed hand-written descriptions of borehole cores. «RAM « (Raadplegingssysteem voor Mijnkaarten) is a new GIS (Geographical Information System) application for the visualisation of the geographical spread of the inventoried mining maps (over 5000 specimens) and for the analysis of related tabular data. The latter include: the location of the maps in the collec-

tion, geographical co-ordinates, strati-graphical coal seam characteristics, colliery name, map and sheet number, year of exploitation, etc.). Moreover, the GEKKO-database can also be applied to descriptions of borehole cores from neighbouring countries as well, where Westphalian coal-bearing strata have been investigated. Prior to the development of the database, an inventory and subsequent selection has been made of all relevant geological parameters (including abbreviations and symbols) used for the description of the cores (hand-written descriptions in the so-called «carnets de débitage» or «doorkloppingsverslagen»). The local or private terminology (e.g. descriptions of lithologies, sedimentary structures, ichnofossils, etc.) in use at the Campine collieries, had to be «translated» first and grouped into a standard geological glossary.

The RAM-information system can be extended depending on future applications. Indeed, digitised geographical information can be added, such as: information on faults, data on the thickness and composition of individual coal seams, chemical analytical data, location of galleries and stonedrifts, location of boreholes and that of mined panels).

AN ACTIVE CALCAREOUS TUSA IN THE MOMBEEK VALLEY, ZAMMELEN NATURE RESERVE (HASPENGOUW, SOUTH LIMBURG)

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Although post-glacial (Holocene) calcareous tufas are well known, especially from the Condruz and Gaume regions in Belgium, active calcareous tufas are less frequent and even exceptional in Flanders. A calcareous tufa actually forms in the Mombeek valley, Zammelen nature reserve, South of Hasselt (South Limburg). This carbonate deposit results from the precipitation of calcite out of seepages along the 60-m contour line at the foot of the steep eastern flank of the asymmetrical Mombeek valley. The seepages generated a local swamp at the border of which thin calcareous crusts develop. The presence of the carbonate-precipitating seepage's is possibly related to the occurrence of a fault affecting the calcareous Heers (Late Palaeocene Gelinden marls) and Maastricht Formations (Late Cretaceous calcarenites). Both formations occur at shallow depths below a thin colluvium cover in the Mombeek valley.

Optical and scanning electron microscopic analysis point to a rather passive encrustation of mosses, higher plant fragments and mollusc shells, as well as to an

active cyanobacterially induced precipitation. The encrusted molluscs include both freshwater (*Lymnaea*, *Pisidium*) and terrestrial genera (*Pupilla*). In thin section the tufa display a characteristic spongy appearance with abundant moulds of higher plant debris (leaves, twigs and mosses). The calcite crusts are formed of succeeding bands of brown micrite and more limpid anhedral, blocky or fibroradial sparite (often showing triangular sections) lining the plant debris and mosses. Locally the tufa encloses small patches of carbonaceous mud (swamp facies) and silt-sized quartz and glauconite grains (contamination by Caenozoic sands). Higher magnification reveals the presence of encrusted algal filament networks as well as rich populations of living diatoms (*Cocconeis*, *Navicula*, *Achnanthes*, *Synedra*, *Amphora*, *Rhoicosphenia*, *Diploneis*, and *Nitzschia*). The latter are not encrusted and do not actively participate in the carbonate precipitation process. The lower surface of the crust shows a conspicuous cauliflower-like morphology due to the presence of irregular mm-sized knobs of nodular calcite precipitates. The latter are composed of fibroradial sparite fans with internal layering (micrite laminae). They are interpreted as individual colonies of calcite-precipitating cyanobacteria, closely resembling microstromatolitic structures.

It is noteworthy that Holocene tufas have been used as a building stone in South Limburg at least since Roman times. In many villages of the same area medieval church towers contain tufa stones: apparently they have been "recycled" from older buildings (e.g. the 2nd century Roman buildings and the 13th century medieval walls of Tongeren). Microscopically the tufa used as a building stone, shows good analogy with the recent tufa of Zammelen. Organic components are almost identical, including encrusted mosses and plant debris (exclusively moulds), mollusc shells and tubiform algal structures. However, the building material is more compact and less porous than the recent tufa, due to successive diagenetic recrystallizations of the calcite over the years. Its provenance is still a matter of speculation: we favour a local origin rather than a remote provenance (import by the Romans) such as the Condroz area. Due to the numerous outcrops of Caenozoic and Mesozoic calcareous strata in Southern Limburg, tufas might easily have formed in similar settings as Zammelen. Subsequently, these deposits could have totally been quarried by the Romans and used for local building purposes.

REFERENCES

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BODENKUNDLICHE KARTIERUNG IM DEUTSCH-NIEDERLÄNDISCHEN GRENZGEBIET ALS GRUNDLAGE FÜR LANDSCHAFTSPLANUNG UND BODENSCHUTZ-BODENKARTE VON NORDRHEIN-WESTFALEN

1 : 50 000 Blatt 4702 Nettetal

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Das Land Nordrhein-Westfalen wurde in den Jahren 1968 - 1997 flächendeckend im Maßstab 1 : 50 000 bodenkundlich kartiert. Dieses Kartenwerk umfaßt 72 Blätter. Mit der Herausgabe des Blattes L 4702 Nettetal, welches das deutsch-niederländische Grenzgebiet mit dem Maastal zwischen den Städten Roermond und Venlo umfaßt, wurde im Jahre 1995 auch die bodenkundliche Landesaufnahme des Niederrheingebiets abgeschlossen.

Auf diesem Blatt wie auch auf den meisten übrigen Karten mit belgischem und niederländischem Anteil werden die Bodenverhältnisse grenzüberschreitend im Blattabschnitt dargestellt. Dazu wurden die bereits vorliegenden niederländischen Bodenkarten übernommen und in Abstimmung mit den Kollegen des Winand Staring Centrum, der ehemaligen Stiboka in Wageningen entsprechend den Grundsätzen, die der Bodenkarte von Nordrhein-Westfalen zugrunde liegen, bearbeitet: Bodentyp (Entwicklungszustand), Bodenart (Korngrößenzusammensetzung des mineralischen Bodens), Bodenartenverdichtung, Ausgangsgestein sowie Wasserhältnisse kennzeichnen maßgeblich die Böden.

Gleiche oder ähnliche Böden werden zu Bodeneinheiten zusammengefaßt und gegeneinander abgegrenzt. Auf dem stark gegliederten Blatt Nettetal mit häufig engräumig wechselnden Bodenverhältnissen war eine starke Zusammenfassung zu 49 Bodeneinheiten erforderlich.

Die Darstellung der niederländischen Codierung in der Legende soll dem nur mit der niederländischen Bodenkarte vertrauten Kartenbenutzer den Zugang zur Bodenkarte erleichtern.

Die Böden auf Blatt Nettetal kennzeichnen einige wichtige Bodengroßlandschaften, so das weite Decksandgebiet westlich der Maas, die stark gegliederte Flußlandschaft der Maas, den Grenzwald mit seinen sandigen und kiesigen Böden sowie die Schwalm- und Netteplatten mit ihren fruchtbaren Böden aus Sandlöß und Löß.