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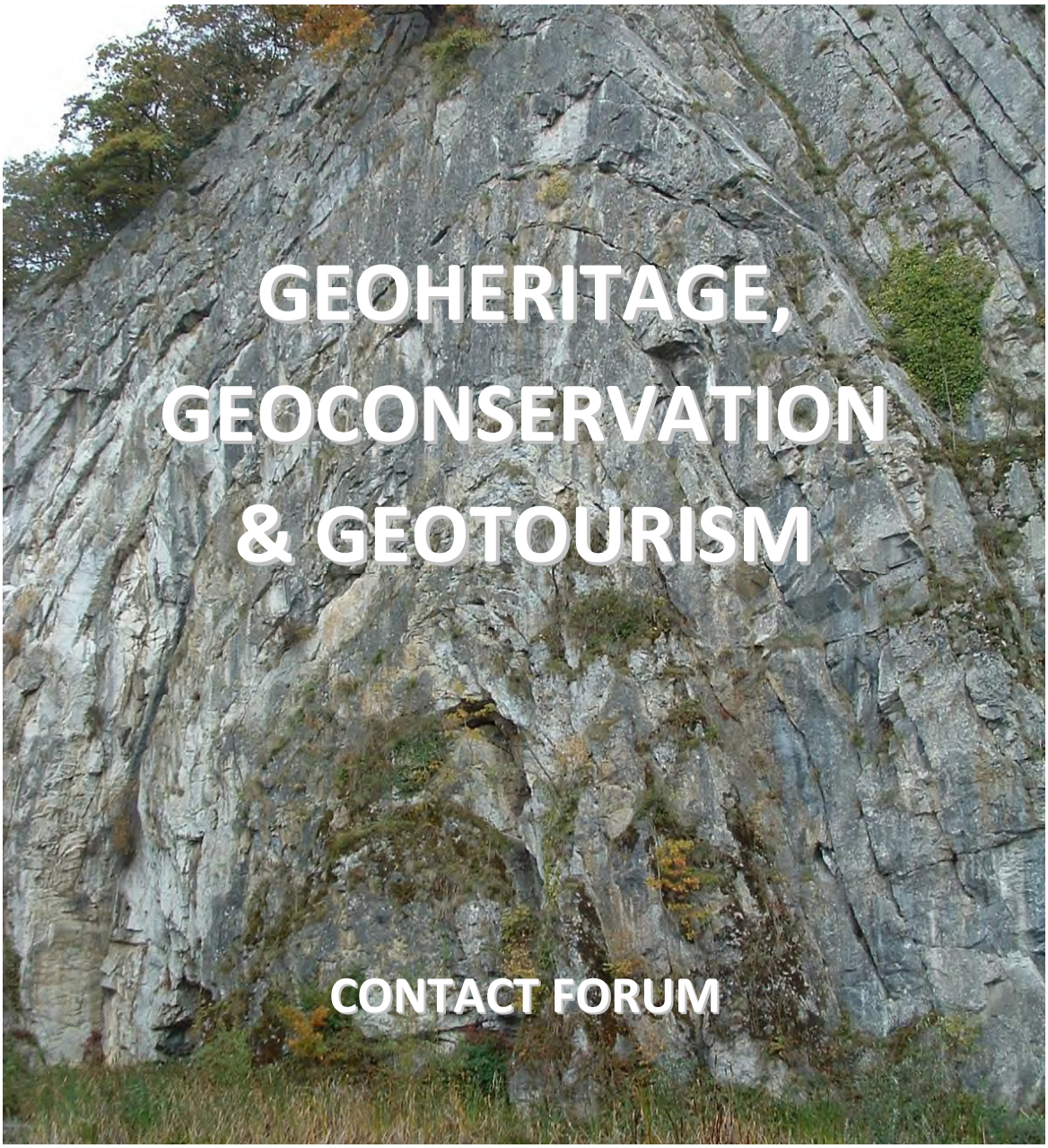

GEOHERITAGE, GEOCONSERVATION & GEOTOURISM

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Geological Survey of Belgium

GEOTOURISM IN THE OURTHE VALLEY, PROVINCE OF LIEGE, BELGIUM

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1. Introduction

The Ourthe valley is particularly favourable for projects of geotourism. This opportunity has been enhanced by the creation of the RAVeL 5, a path for walkers and bikers established on the ancient river towpath.
Between Comblain-au-Pont, the site of the confluence of the Ourthe and Amblève rivers, and Liège, where the Ourthe river flows into the Meuse river, a lot of outcrops are visible, at some places really spectacular. The river flows from the S to the North and the general strike of the bedding planes are E-W, so that the river crosscuts and exposes many geological formations.
At Comblain-au-Pont, the southern end of our itinerary, a tourist cave, several wild caves, an underground sandstone quarry and a geological trail make the village a real geological paradise. Moreover, the stratigraphic monument project will certainly increase the geoheritage potential of this location.

2. The Ourthe valley, from Liège to Comblain-au-Pont

In a beeline, the distance between Liège and Comblain-au-Pont is only 16 km, but the meanders of the river double the distance to 33 km. From Liège to Comblain, the Ourthe river crosses several geographical regions and different geological formations (Fig. 1).

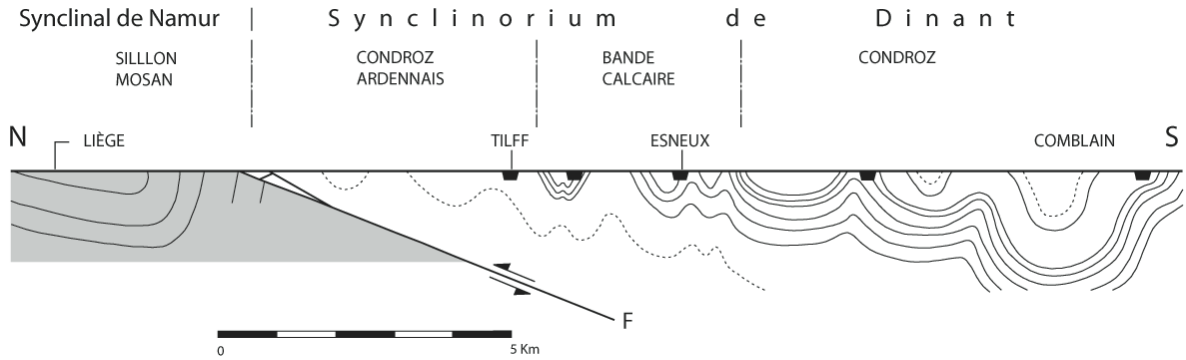

Fig. 1. Simplified geological cross section from Liège to Comblain-au-Pont.
The Dinant Synclinorium overthrusts the Namur Syncline

Liège is located in the so-called Namur Syncline. Here mainly Namurian shales and Coal Measures (shales, sandstones, coals) are outcropping. One of the first stops of the geological trail shows a former access to an ancient mine of sphalerite and galenite (Fig. 2).

South of the Namur Syncline lies the so-called Dinant Synclinorium, a huge basin in which we shall cross three natural regions: first the Ardennian Condroz, then a limestone strip, and finally the “true” Condroz area.

Fig. 2. Entrance of a former lead and zinc mine in Namurian rocks along the Liège-Esneux road

The Ardennian Condroz displays essentially lower Devonian rocks. The limestone strip is made of middle and upper Devonian limestones (Fig. 3 and 4). The true Condroz area is a very distinctive region, made up of an alternation of Famennian (Devonian) sandstones and Dinantian (Carboniferous) limestones (Fig. 5). The latter formations provide the two main building materials to the houses of Condroz: the micaceous sandstones for the walls and the bioclastic limestones for doorsteps, lintels and mullions. The Famennian sandstones, also known as Ourthe sandstones, are more resistant to erosion than the limestones, and they sometimes crop out at higher altitudes in the region, up to 300 m. They are the main geological formation used for building stones. In the former La Gombe quarry, for instance, bedding planes and two sets of joints divide the rock in large parallelepipeds that are easy to cut or extract as ashlars (“moellons”) (Fig.6).
The Carboniferous limestone crops out in large synclines. Some of these are excellent sites to teach how to make a geological cross-section (Fig. 7).
The bikers or hikers geological fieldtrip, from Liège to Comblain-au-Pont, takes one, two or three days, according to the number of stops the hikers or bikers want to look at. But once arrived at Comblain, the nature lovers are certainly not at the end of their discoveries.

Fig. 3. (left) Thamnopora, a characteristic Frasnian tabulate coral, Saint Anne cave near Tilff (Esneux)
Fig.4. (right) A syncline in the Devonian limestones at Loneux, on the left bank of the Ourthe

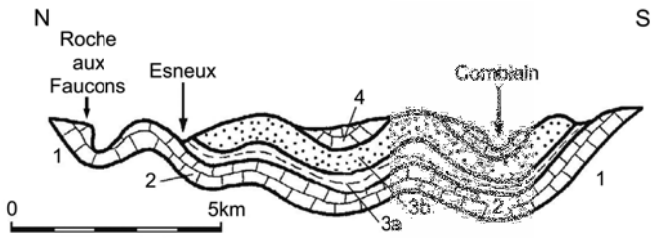

Fig. 5. Simplified NS geological section from Esneux to Comblain-au-Pont.
1. Eifel and Lower Devonian, 2. Givetian and Frasnian limestones, 3a.Lower Famennian shales,
3b. Upper Famennian sandstones, 4. Lower Carboniferous limestones.

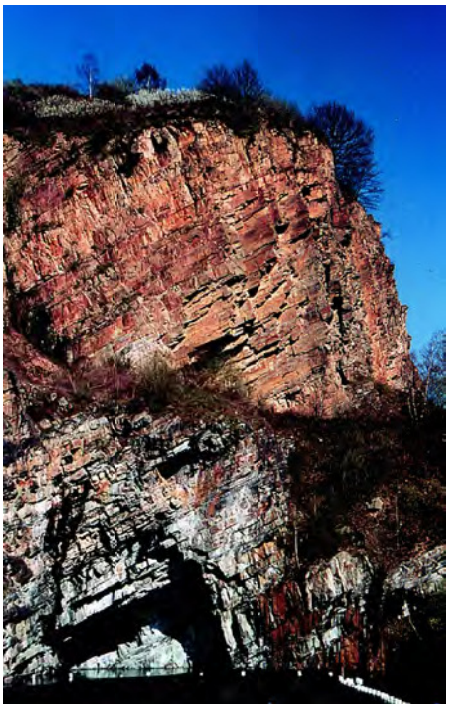

Fig. 6. The La Gombe quarry, exposing the Montfort Formation (with red beds at the top), from which the micaceous Ourthe sandstones have been extracted

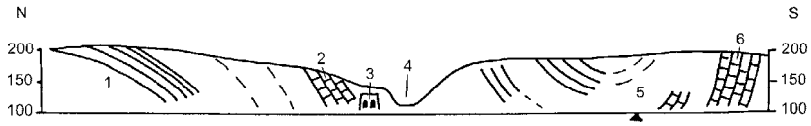

Fig. 7. Geological section of the Chanxhe syncline. 1. Richopré quarry (Famennian sandstones), 2. Limestone quarry, 3. Lime kiln, 4. Dry valley, 5. Blue hole: resurgence, 6. Quarry (Dinantina crinoidal limestone)

3. Comblain-au-Pont, a potential "mecca" for geotourism

With a nice and well-investigated tourist cave, an abandoned underground stone quarry and a geological path containing twenty-five explanatory boards, Comblain-au-Pont is a rich geological site. Moreover, a new and real geological monument - a giant stratigraphic scale - is actually in preparation and will add to the geological attraction pool of the area.

3.1. The cave and "abyss" of Comblain-au-Pont

The Comblain-au-Pont cave and abyss are located at less than 800 m - in a beeline - from the Ourthe river, and at less than 800 m in walking distance from the market-place. This cave is managed by a small non-profit-organisation, "Découverte de Comblain", that works in close cooperation with the Municipality Council. The cave has been formed in Visean limestone, which is partly well-bedded, partly brecciated. The general direction of the bedrock is E-W and so is the general elongation of the cavern; but the cave chambers are elongated along a N-S axis, following the direction of the joint planes. The hydrographical basin extends E-W, as the Visean syncline in which lies the cave. A lot of swallowholes feed the cavity. Some of them are located 8 km upstream. The speleogenesis is very complex. Feeded by swallowholes, the cavern has also experienced phreatic floods, filling the whole cavity. In the lower passages, small river pebbles indicate a fluvial action underground. Speleothems are abundant and display various shapes. Among them, in a shallow part of the cavern, the presence of "moonmilk" is noteworthy (Fig. 8).

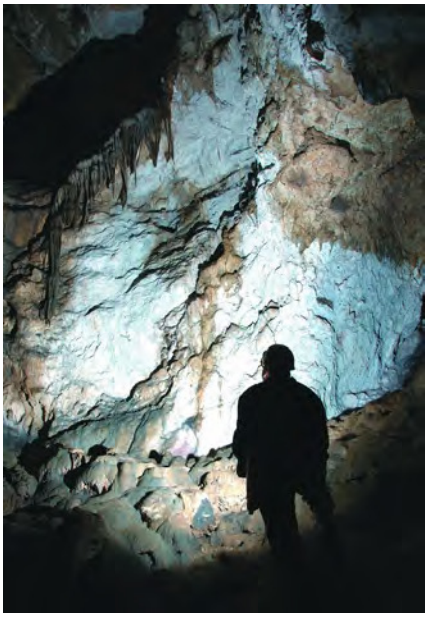

Fig. 8. Comblain-au-Pont cave.
The moonmilk (Mondmilch) – not open to the public.

A few isotopic analyses of some stalagmites reveal ages ranging from 7 750 years to 166 000 years (Gewelt, 1985 and 1986). The CO_2 content of the cave air is very variable between summer and winter: whereas in winter the CO_2 partial pressure is rarely above 5000 ppm, in summer, it can reach values over 20 000 ppm (Fig. 9). Currently, the Public Service of Wallonia is starting a pilot study of the cave climate.

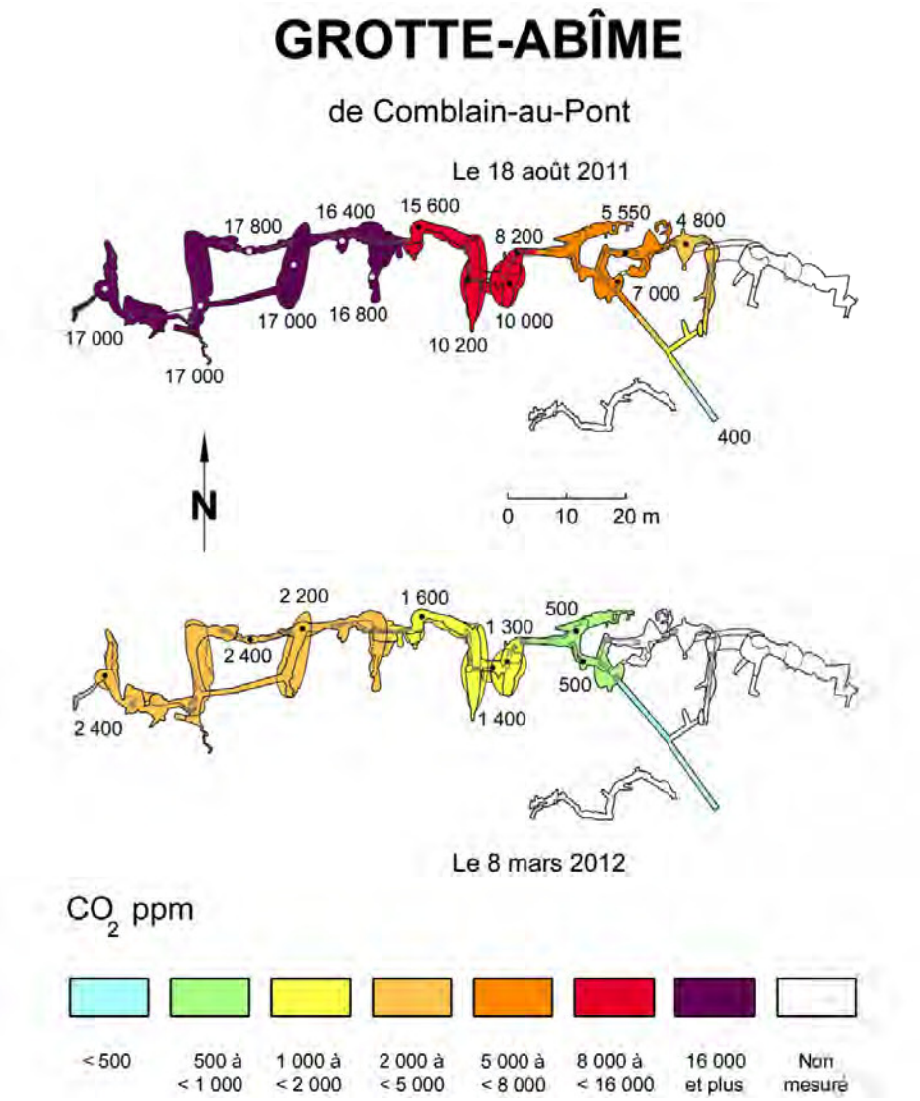

Fig. 9. CO_2 seasonal variation in the ambient air of Comblain-au-Pont Cave: carbon dioxide is much more abundant in summer than in winter

3.2. The underground stone quarry

Famennian sandstones were deposited about 370 million years ago and folded about 270 million years ago. They represent the main building stone in the Condroz area. After quarrying the rocks in the valley sides, builders have looked for the best or most suitable sandstone beds and quarried them further underground. One of these quarries is now closed and protected as a sanctuary for bats. Another quarry occasionally opens for the public to show the ancient underground mining conditions (Fig. 10).

Fig.10. Ancient underground quarry in the Upper Famennian Sandstones of Comblain-au-Pont.

3.3. The geological trail

A twelve kilometre long trail displays a lot of geological phenomena around the town of Comblain-au-Pont. About twenty-five explanatory boards are posted along the footpath (Fig. 11). The points of interest not only include geological objects, i.e. include Carboniferous limestones, Famennian sandstones and their tectonic structures, Cenozoic sands, but also a few spots where particular vegetation or flora is described.

Fig.11. Explanatory boards along the 12 km long attractive geological trail at Comblain-au-Pont. Shortcuts are possible. The boards include also some information on vegetation.

3.4. A huge stratigraphic scale

Along the geological path and just beside the educational quarry (cited in § 2.2), a gigantic stratigraphic scale, made of true rocks, is in project.
A complete set of all the known rocks of Wallonia will be displayed, from the oldest (Cambrian) to the Quaternary. This geological monument will show the rocks at a "scale" of one meter per ten million years. From the first Cambrian formation of Belgium - 540 million years ago - to now, the stratigraphic scale will thus extend over 54 meter, and will be exposed along a hillside of the Ourthe river (Fig. 12).

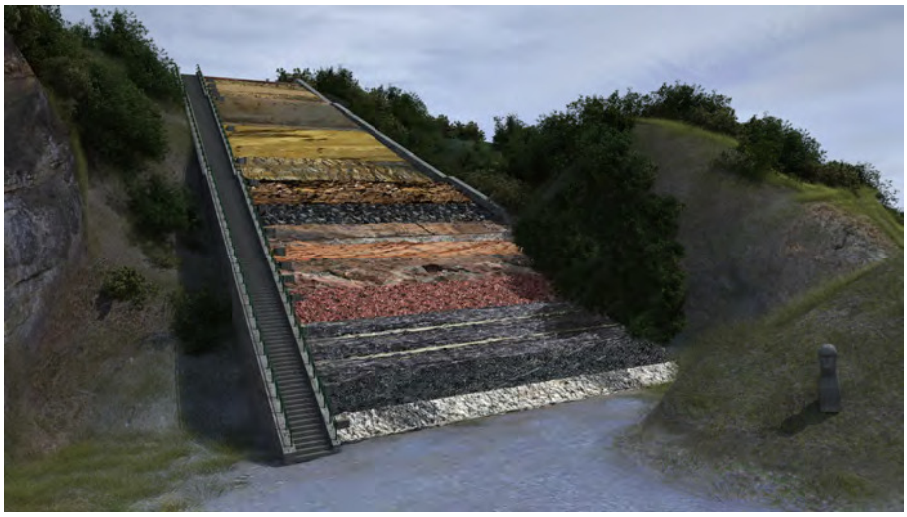

Fig.12. An artist's view on a project of a true geological monument: the stratigraphic scale of Belgium in real stone, derived from and representative of all known geological formations.

Acknowledgements

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