WEATHERING ON THE DEVONIAN SLATES AND CHARACTERIZATION OF A BENTONITE LAYER IN THE WESTERWALD (GERMANY)

FONTAINE FRANÇOIS* (1), HAMAEKERS HELEN (2), HOFFMANN ANDREAS (3), YANS JOHAN (4) & FAGEL NATHALIE (1),

(1) AGEs, Argiles, Géochimie et Environnement sédimentaires, Université de Liège, Belgium
(2) Sibelco Belgium, Dessel, Belgium
(3) Sibelco Deutschland GmbH, Ransbach-Baumbach, Germany
(4) Département de Géologie, ILEE, Université de Namur, Belgium
**Corresponding author: f.fontaine@ulg.ac.be*

The Westerwald region is one of the largest and oldest clay mining areas of Germany. Those deposits were formed during the Eocene and Oligocene as a result of the weathering, erosion and redeposition of Devonian rocks. During the Miocene, intense volcanic activities led to a large basalt cover, protecting the clays from the erosion.

The two main goals of this study are first to improve the knowledge on the weathering processes of the Devonian slates that led to the current setting of those clay deposits by studying the mineralogical and chemical composition of the clays with depth. The second goal is to characterize a bentonite layer underneath the Miocene basalt cover using quantitative X-ray diffraction, chemical analysis, BET, cation exchange capacity and scanning electron microscope.

A 20 meter deep quarry mining the Devonian bedrock in southern Westerwald has been sampled on its entire depth. The XRD results show no significant variations of the mineralogy with depth, except for the phyllosilicates. The minerals of the < 2 µm fraction are illite, kaolinite, smectite and mixed-layers minerals (vermiculite-chlorite and illite-chlorite). The proportions of the minerals in the mixed-layers chlorite-vermiculite vary with depth. At the bottom of the quarry, the proportion of vermiculite is very low while in the top, the proportion of vermiculite is higher. This is explained by the degree of the weathering, logically more intense at the top of the quarry. Trace elements compositions are currently being investigated.

A 3 meter thick greenish to brownish bentonite layer has been found in the eastern part of the Westerwald region. The XRD performed on different samples of this bentonite shows a relatively heterogeneous composition: montmorillonite (60-80%), kaolinite (5-12%), illite (0-7%), goethite (2-15%), talc (0-10%), K-feldspars (0-7%), plagioclase (0-4%) and traces of amphibole and pyroxene. This bentonite is probably the result of the weathering of volcanic ashes. Since there are not many outcrops of this bentonite layer, its spatial distribution is studied by drilling.