

Abstract – PhD project HEEREN Marie (Université de Liège, Belgium)

"Assessment of geological hazards and geothermal resources associated to the transverse faults of Eastern Belgium"

The Eastern part of Belgium is marked by a relatively high level of seismic activity that is mainly related to the presence of transverse faults. Therefore, it is particularly important to assess various types of geological hazards in this region. In addition, it is likely that the geothermal potential is higher in that area as in many cases a higher seismo-tectonic activity is accompanied by a stronger fracturing of rocks. Those locally fractured and thus more permeable rocks may then form a geothermal reservoir at depth (that could be exploitable). The first goal of this study is to characterize the structure of the transverse faults of Eastern Belgium by the quantitative analysis of the LIDAR DEM and multi-spectral remote imagery of the area. Secondly, some specific sites located along/near the Hockai Fault Zone and along the Western part of the Roer Valley Graben will be investigated by 3 different geophysical methods: the H/V microseismic technique as well as the electrical resistivity and the electromagnetic methods. Thirdly, 3D structural models will be completed for sub-areas on the basis of existing geological data and the new digital morphological and geophysical information. The models will be used as inputs for the geological hazard and the geothermal potential evaluation.

In this area, which had already experienced a devastating earthquake in 1692 (the Verviers earthquake), seismic hazard will be re-assessed on the basis of newly compiled seismo-tectonic data (e.g. more precise position and determination of the extent of fault structures). In particular, those data will allow us to define size-frequency statistics (Gutenberg-Richter Law, fractal analysis of the lengths of fault traces) for the area. Further, it will be analysed if the seismic activity could play a role as landslide triggering factor (especially in the Battice region in the North of Verviers). Geothermometers analyses coupled with heat flux and mass transport simulations will finally be used to evaluate the geothermal potential for some sub-areas.