



## **Seismicity of the Ardenne (Belgium) : spatial distribution and implications in terms of active tectonics**

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The Ardenne region, although in intraplate context, presents a moderate seismic activity. Seismic pattern and structural knowledge of the region are not only keys to regional seismic hazard prevention, but also to a better understanding of the regional seismotectonic framework.

In 1692 a magnitude  $6\frac{1}{4}$  earthquake destroyed the city of Verviers and caused damages as far as Dover (UK). Still ongoing historical researches are getting the localization of this event more and more precise. The research for the fault responsible for the 1692 quake has led to preliminary surveys in the Verviers region. The recent study along the Vesdre river gives good confidence that its terraces are displaced by at least one major fault and maybe some more smaller faults. Recent subsurface geophysical study of the supposed fault trace gives clues to assess for its presence but no certitude for it, further analyses will be necessary.

Elsewhere in the Ardenne, the precise location of every event of an earthquake swarm that occurred in 1989–1990 in the Hockai Faulted Zone (HFZ) allowed us to map a fault plane with great resolution. This shows the importance of having precise earthquakes locations.

These two elements show the necessity to search for major active faults, which will benefit from a complete seismotectonic analysis. In this study, we focus on a region broader than the HFZ or the Verviers area, ranging  $5^{\circ}$  to  $8^{\circ}$  East and  $49.5^{\circ}$  to  $51.5^{\circ}$  North.

The aim of this work is, on one hand, to identify seismically active structures that will be analysed using different means : from aerial photographs or satellite imaging to

geomorphological and geophysical surveying in the field. On the other hand, analysing the focal mechanisms will better constrain the regional tectonic setting.

Seismograms recorded for the past 22 years are being controlled and processed to re-localize all events. The location process is achieved by adapting and using different tools commonly used worldwide. The main advantage is that all the data are processed at once, which greatly improves the relative location accuracy as the corrections for each station are computed for the whole dataset. The focal mechanisms are also calculated when possible.

The newly localized events evidence at least 3 interesting zones which present well aligned events or at least earthquakes concentrations. Even though the analysis of focal mechanisms is still incomplete, we can already show the main trends and some heterogeneities in the regional present-day brittle deformation field.