Towards a Lithotectonic Framework for Belgium

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Nearly every geological subdiscipline relies to some degree on regional geological knowledge. In the introductory section of most geological papers it is standard practice to provide regional geological background information. Stratigraphic terminology is often well defined while other disciplinary concepts rely, at least to some degree, on generally agreed definitions or hierarchical schemes, such as paleontological, structural or magmatic terminology. This, however, is much less the case for the regional geological building blocks. Their names are usually composed of a combination of a geographical locality and a geological term. A few examples from Belgium are Brabant Massif, Campine Basin, Stavelot-Venn Inlier, and Malmedy Graben. Most of these have in common that, although their importance is well recognised, their definitions are vague and sometimes even conflicting, in that their meaning may differ between contexts and authors. Even if their meaning has drifted or become less exact, as a result of their frequent historical use, they commonly remain in use today.

This issue is not exclusive to Belgium, but seems to be an altogether historic and worldwide phenomenon. Recently within Europe there is a growing awareness of this issue, resulting in important but rather isolated efforts to better structure and define regional information (Hintersberger et al. 2017; Németh 2021; Le Bayon et al. 2022) which have been brought together through pan-European cooperation (GSEU – Horizon Europe 101075609). The central element that seems to encompass most geologic features, is the lithotectonic unit (a distinct unit based on its partly separate geological history; URI: http://inspire.ec.europa.eu/codelist/GeologicUnitTypeValue/lithotectonicUnit). Grabens, basins and inliers are examples of lithotectonic units. In order to define and describe these units more accurately, lithotectonic limits are introduced. These are planar features, such as faults and unconformities, that correspond to the geologic events that formed the lithotectonic unit (Piessens et al. 2024). All information is organised and linked in vocabularies (thesauri) that together not only adequately define each concept, but also determine the relations between them, placing them in space and geological time (Plašienka 1999). This outlines the core methodology, around which 2D and 3D multi-scale visualisations are built, annotations can be added, existing ontologies can be linked (such as the ICS Geological Time Scale Ontology; Cox and Richard, 2005) and newly developed extensions such as the Modified Wilson Cycle (Németh 2021). As such, the work at Belgian level is closely linked to the ongoing international developments.

Making use of the ongoing developments at European level, Belgium was the first country to set up a lithotectonic working group that became operational in 2023. Its first goal is to provide a lithotectonic framework that describes a starting set of main geological units and limits in Belgium, according to emerging European standards (the work at European level is linked to the implementation of INSPIRE and

is in communication with the GeoSciML community), by the end of 2024. The working group meets approximately every 2 months, and organisationally resides under the National Commission for Stratigraphy in Belgium. The working group will soon be looking for additional experts (junior and senior) in its continuing effort to identify and define broad superstructures, detail the regional geology to the more local level, to tackle new types of lithotectonic elements, or better address parts of geological history. Potential candidates are encouraged to contact one of the authors or the NCS secretariat.

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