Building a Lithotectonic Framework for Belgium

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Almost all geological subdisciplines depend, to varying extents, on regional geological knowledge. Stratigraphic terminology is typically well-defined, while other concepts rely on generally accepted definitions or hierarchical schemes, such as palaeontological, structural and magmatic terminologies. This is much less the case for the regional geological building blocks. Their nomenclature is usually composed of a reference to a geographical locality and a geological term. Examples from Belgium include the (Anglo-)Brabant Massif, Campine Basin, and Malmedy Graben. Despite wide recognition, such terms often lack precise definitions and may even present conflicting interpretations across different contexts and authors. Even when their meanings have drifted or become less precise, these terms continue to be utilized.

Increased awareness has led to significant yet isolated initiatives aimed at improving the structure and definition of regional geological information [1-3], recently brought together through pan-European cooperation [4]. Lithotectonic unit appears to be the most effective concept for encompassing all geological features. A lithotectonic unit is characterized by its composition, structural elements, mutual relations, and/or geological history [5]. Following a geotemporal conceptual approach, lithotectonic units are defined and bounded by relative limits in time and space [6]. Lithotectonic limits are planar features corresponding to geological events which have formed and define these units. Examples of lithotectonic units include orogens, terranes, sedimentary basins, and grabens, while examples of lithotectonic limits include deformation fronts, faults, and unconformities.

This approach facilitates the organization and formalization of relationships between units and limits through ontologies. The data model can be linked to established ontologies, such as the ICS Geological Time Scale Ontology [7], and allows future extensions, such as attribution to orogenic cycles [2]. The associated concepts can be linked to 2D and 3D visualizations, thereby adding an important layer of knowledge to geological maps and models.

Primary objective of the newly established Lithotectonic Working Group, under the National Commission for Stratigraphy in Belgium, is to create a comprehensive lithotectonic framework, that systematically defines and describes the main geological units and limits of Belgium. This initiative aligns closely with emerging standards currently being developed and implemented at European level [4] and largely based on GeoSciML [8].

References:

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