Lithostratigraphy and lithodemy in metasedimentary rocks of the Austroalpine – New insights from the Stangalm-Brenner Mesozoics (Ötztal-Bundschuh Nappe System, Austria)

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The classification of lithostratigraphic and lithodemic units is a fundamental task in the characterisation of lithologically mixed and/or structurally complicated rock assemblages of intrusive igneous, metamorphic or “mixed” nonstratiform rocks, obligatory for work in map legends and databases at the Geological Survey. Several concepts, such as the “North American Stratigraphic Code (NASC)” proposed by the North American Commission on Stratigraphic Nomenclature (2005) and the “British Geological Survey Rock Unit Classification System” (BRUCS; 2021) provided guidelines and naming conventions. The NASC introduced the term lithodemic unit for intrusive, penetratively deformed, and/or highly metamorphosed rocks, which have lost their primary structure of stratification and position within a stratified sequence through metamorphism or tectonic processes. According to the NASC, lithodemes are distinguished and delimited based on rock characteristics. Contrary to lithostratigraphic units, a lithodemic unit is generally non-stratiform (i.e. it does not conform to the Law of Superposition). The BRUCS-classification bases on the genesis of the rocks and introduces a hierarchical system of classification that corresponds to lithostratigraphic ranks. Non-stratiform units are subdivided into 1) intrusions; 2) tectonometamorphic units; 3) mixed-class units. Partly mentioned in former concepts is the immiscibility of definitions for tectonic and stratigraphic units respectively. However, regarding nomenclature and/or hierarchical classification, these concepts still leave room for discussion, especially when the available data is incomplete or the metamorphic/tectonic overprint is gradually increasing. Further complications arise if such a geological unit is non-contiguous and scattered over a wide area. Where to define the boundary between non-metamorphic and metamorphic rocks? It useful to mix lithostratigraphic and lithodemic terminology expressing the controversity respectively complexity of such a challenge? The Permo-Mesozoic cover of the Ötztal-Bundschuh Nappe System represents a prime example to discuss the differences and applicability of these lithodemic classification systems. The well-known metasedimentary sequences occur East (Stangalm Mesozoic s.l.) and West (Brenner Mesozoic) of the Tauern Window. Both, the Stangalm and the Brenner Mesozoic show an upright section with a southeastward increasing temperature gradient. Fossil-bearing units were overprinted during low-grade (~400 °C) and homogenously obliterated units during high-grade (> 500 °C) metamorphic conditions. While the Brenner Mesozoic is traditionally defined based on lithostratigraphic criteria, recent mapping in the Stangalm Mesozoic provided a lithodemic classification (Iglseder et al., 2019). Highly deformed rocks of the Allgäu-Ruhpolding-Ammergau Formations occur at the structural top of both metasedimentary sequences (Metamorpher Kalkkomplex/Brenner Mesozoic and Leckenschober Lithodeme/Stangalm Mesozoic s.l.) and underline the parallelism of the two Mesozoic cover sequences. Altogether, to allow for the amalgamation of the Mesozoic cover of the Ötztal-Bundschuh Nappe System East and West of the Tauern Window, we propose the term Brenner–Stangalm Complex.