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Regional correlation of the Dorozsma marble (S Hungary, Tisza Mega-unit) – a petrographic and isotope geochemical study

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The crystalline basement of the Tisza Mega-unit comprises several sub-basins and basement highs due to the Miocene continental extensional tectonics. In the study area, the Dorozsma basement belongs to the Algyő High, which forms a Hungarian part of the Biharia Nappe system according to the recent interpretations (Matenco & Radivojevic, 2012). The Algyő High is predominated by metapelitic and metabasic rocks with a few-tens-of-meter-thick marble zone belonging to a shear zone. The nearest outcrops of the Biharia Nappe system are located in the Highiş Mts (SW Apuseni Mts, Romania).
The major aim of this study is to provide petrographic and isotope geochemical information about the marbles derived from the Dorozsma basement and the Highiş Mts in order to reveal the relationship between them. Micropetrography, fabric-selective carbon and oxygen isotope measurements as well as 87Sr/86Sr isotope analyses were carried out for this purpose.
The dominant part of the samples from borehole Dorozsma–54 is very fine–fine-grained marbles showing a heteroblastic texture with a composition of dolomite+calcite+quartz+muscovite+Mg-chlorite±talc±phlogopite. The grain boundaries are mainly sutured and embayed. Dominantly, type II and IV deformation twins are present (Burkhard,1993). The samples from borehole Dorozsma–4 show features of significant alteration. They contain many deformation structures and sheared domains with microcrystalline calcite+Mg-chlorite+talc, while the slightly altered parts of the marble consist of dolomite with core-mantle structure. Marble breccia is also present which contains clasts of marble and very fine-grained calcite. Microcrystalline calcite forms the matrix of the breccia, while fractures are cemented by dolomite+calcite. Dolomite cement usually shows saddle-like morphology.
The marble samples from the Highiș Mts have a composition of calcite+quartz+plagioclase feldspar+muscovite+chlorite and show heteroblastic and homeoblastic textures. The grain boundaries are mainly curved, rarely embayed. Type II deformation twins are dominant (Burkhard, 1993). In some samples, lamination can be observed defined by the variation of very fine (20–30 μm) and fine-grained (200–400 μm) carbonate bands.
The δ13CV-PDB values of Dorozsma marble range from -2.3‰ to 1.9‰ while the δ18OV-SMOW values fluctuate between 14.5‰ and 22.5‰Ṡignificant part of the marbles was subjected to various degree of alteration, but the δ13CV-PDB and δ18OV-SMOW isotope data from some unaltered samples are very similar to those of the isolated marble lenses from the eastern part of the Biharia Nappe system (Reiser et al. 2017). The marble samples from the Highiş Mts have δ13CV-PDB values from -1.1‰ to -0.1‰ while the δ18OV-SMOW values vary between 15.2‰-19.7‰Ṫhe 87Sr/86Sr values of the Highiș marbles range between 0.70861–0.70930 that is quite similar to the data of Reiser et al. (2017). In contrast, Dorozsma marbles provide higher values (0.70973–0.71372), suggesting a significantly different protolith and/or a distinct evolution. So, a direct correlation between the marble lenses of the Apuseni Mts and those of Dorozsma seems to be implausible.
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References

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