



New age data and geothermobarometric estimates from the Apuseni Mountains (Romania); evidence for Cretaceous amphibolite-facies metamorphism

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New Ar-Ar ms, Rb-Sr bt and Sm-Nd grt age data in combination with microprobe analyses and structural data from the Apuseni Mountains provide new constraints for the tectonic evolution of the Tisza and Dacia Mega-Units during the Late Jurassic-Late Cretaceous time interval, which is of special importance for the present day arrangement of tectonic units in the Alpine-Carpathian-Dinaridic region.

Late Jurassic obduction of Transylvanian Ophiolites (155 Ma) partially reset Ar-Ar ms ages at the top of the Biharia Nappe System in the Dacia Mega-Unit. New Sm-Nd grt ages and P-T estimates yielded amphibolite-facies conditions of 500°C and about 0.8 GPa during the Early Cretaceous (125 Ma Sm-Nd age) for the Dacia Mega-Unit and during late Early Cretaceous times (104 Ma Sm-Nd age) for the Tisza Mega-Unit. This implies that not only the Dacia Mega-Unit, but also the Tisza Mega-Unit experienced a strong regional metamorphic overprint accompanying Alpine deformation.

New 95 Ma Ar-Ar ms and 81 Ma Rb-Sr bt ages from the Bihor Nappe (Tisza Mega-Unit), in combination with fission track ages constrain rapid cooling of more than 20°C/Ma after the thermal maximum. The amplitude of cooling corresponds to data from the Dacia Mega-Unit, which started cooling 20 Ma earlier, but at a rate of only about 12°C/Ma.

Kinematic indicators and stretching lineations show NE-directed, in-sequence nappe stacking for the Tisza and Dacia Mega-Units during "Austrian Phase" deformation (125-100 Ma). Following the Austrian Phase, the Dacia Mega-Unit was thrust over the Tisza Mega-Unit during the Turonian Phase (93-89 Ma). Constrained through NW-directed kinematic indicators and 94-80 Ma Rb-Sr bt ages, this tectonic phase is responsible for a pervasive retrograde greenschist-facies overprint and the geometry of the present-day nappe stack in the Apuseni Mountains.