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Mesozoic ophiolites from the Eastern Carpathians: what are they and where are they coming from?

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The Mesozoic magmatics and peridotites which occur in the Eastern Carpathians (EC), from Rarau Mts. in the north, Haghimas Mts. in the center and the Persani Mnts. in the south, comprise a very large variety of rocks. They range from lherzolites and harzburgites over basalts, basaltic andesites and andesites to trachytes. Despite of various tectonic settings and a large time range, most of the magmatic and ultramafic rocks were regarded by Sandulescu (1984) as ophiolites, and assigned to the Transylvanian nappes (TN) overthrusting the Bucovinian nappes. Other occurrences were interpreted to form olistoliths in the Cretaceous Wildflysch beneath the TN. According to Sandulescu the ophiolites originated in the main Tethyan suture zone, similar to the South Apuseni Mountains (SAM) ophiolites and island arc volcanics.

Our own investigations in the EC and SAM revealed a number of facts which are not consistent with such an interpretation.

1. The Eastern Carpathians volcanics include several MOR-type, OIB-type and magmatic arc basalts. By contrast, the SAM volcanics are built up almost exclusively of MOR-type basalts. They are overlain by a large variety of island arc volcanics, ranging from basalts to rhyolites.

2. There is no coherent ophiolite sequence in the EC, rather dispersed occurrences of ultramafics and volcanics of a wide compositional variation. In the SAM there is a complete and coherent ophiolitic sequence, overlain by island arc volcanics.

3. In EC many basalts and andesites are clearly associated with Mid-Triassic sediments. The SAM ophiolites and the superimposed island arc volcanics are of Mid to Late Jurassic age. This is based mainly on stratigraphic relationships with Tithonian

limestones and the intrusion of Upper Jurassic granitoids into the ophiolites.

4. Trachytes found in the TN and as olistoliths in the Wildflysch of the Persani Mnts., closely associated with basalts, may represent an early stage of the opening of a Triassic Ocean. Thus, they can be interpreted as volcanic equivalents of the Mid-Triassic Ditrau alkaline intrusion, occurring further to the north.

Notwithstanding the possibility of the occurrence of Jurassic basalts, many basalts, andesites and probably also trachytes are most likely Mid to Late Triassic in age. They include magmatic arc basalts as well as OIB type volcanics. Such an association with a comparable Triassic age is known from the Dinarides. Additionally, peridotitic and basaltic fragments with MOR and SSZ geochemistry are found in the Western Carpathians as olistoliths derived from the Mid-Triassic Meliata Ocean. Despite some open questions regarding age-dating and palaeogeography, we suggest that the EC peridotites and volcanics are not related in any aspects to the SAM ophiolites and their associated island arc volcanics, but they are more likely linked with the former Meliata Ocean or even the Dinarides.