



The Eastern Carpathians “ophiolites” (Romania): Remnants of a Triassic ocean

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ABSTRACT

Mesozoic ophiolitic and related rocks in the Eastern Carpathians occur in three areas, from north to south: Rarău, Hăghimaş and Peşani Mts. They are found as blocks ranging from few metres to a few kilometers in size and as centimetre-sized in breccias, most likely embedded in the Late Barremian–Early Albian Wildflysch formation. Compositionally, they range from lherzolites and harzburgites to mafics such as FeTi gabbros, dolerites, basalts, and to andesites. The volcanics comprise highly-depleted basalts/andesites to enriched-type mid-ocean ridge basalts; additionally they include ocean island basalts and calc-alkaline basalts/andesites and trachytes. Based on paleontological evidence, their age is Middle to Late Triassic. They can be clearly compared with remnants of the Meliata–Hallstatt Ocean in the Western Carpathians, but do not match the Jurassic ophiolites and island arc volcanics in the Mureş Zone of the Southern Apuseni Mts. We propose a Triassic ocean connected with the Meliata–Hallstatt Ocean, between (a) the Bucovinian/Sub-Bucovinian continental crust, (b) the Infrabucovinian and finally (c) the Northern Apuseni microcontinents. This ocean closed in the Late Triassic to Early Jurassic causing close juxtaposition of all three microcontinents. An ophiolite complex together with ocean island basalts and calc-alkaline basalts/andesites remained from this ocean and was subsequently eroded and transported as blocks of different size into the Lower Cretaceous Wildflysch basin, together with blocks and clasts of limestones similar to the Mesozoic sedimentary sequences in the Northern Apuseni realm. The Wildflysch formation was thrust as an independent unit during the Albian over the Bucovinian Nappe in the Eastern Carpathians and the Northern Apuseni continental crust, respectively.

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1. Introduction

The Eastern Mediterranean realm, including the Alpine–Carpathian chain as well as the Dinaric–Hellenic orogen, comprises ophiolites which are believed to have mainly formed in three different periods: Mid-Triassic, Jurassic and Late Cretaceous. The Mid-Triassic ophiolites are assigned to the so-called Meliata–Hallstatt Ocean in the Western Carpathians (Kozur, 1991; Harangi et al., 1996; Channell and Kozur, 1997; Ivan, 2002; Faryad et al., 2005) and possibly in the Eastern Carpathians (Hoeck and Ionescu, 2007). Triassic magmatics are also described from the Dobrogea area in eastern Romania (Savu et al., 1980; Seghedi and Szakacs, 1994; Saccani et al., 2004) and Dinarides (Trubelja et al., 2004). Jurassic ophiolites are found in the

Penninic Ocean in the Eastern Alps (Koller and Höck, 1990), and its possible extension into the Eastern Carpathians as the Pieniny Klippen belt (Săndulescu et al., 1982; Hovorka et al., 1984). The most widespread and complete Jurassic ophiolite sequences are confined to the Pindos and the Vardar Ocean (eastern branch and western branch) respectively in the Dinarides and Hellenides (for a review, see Robertson, 2002 and citations therein). Ophiolites and associated island arc volcanics (IAV) from the Southern Apuseni Mountains (SAM) are most likely a continuation of the Eastern Vardar Ocean (Andelković and Lupu, 1967; Saccani et al., 2001; Bortolotti et al., 2002). Jurassic island arc volcanics are also found in the basement of the Transylvanian Depression (TD) as an eastern continuation of the SAM ophiolites and IAVs (Ionescu and Hoeck, 2006; Ionescu et al., 2009–this issue). Upper Cretaceous ophiolites are widely distributed in Turkey, Cyprus and further to the east (see also Robertson, 2002). Recently, some small occurrences were also reported from the “Western Vardar branch” (Karamata et al., 2000; Pamić et al., 2002).

In the Eastern Carpathians (EC) fragments of Mesozoic “ophiolites”, i.e. ultramafics (UM), and mostly basalts to andesites respectively are not completely understood in the stratigraphic framework given

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