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Biostratigraphy and tectonic significance of lowermost Cretaceous carbonate rocks of the Circum-Rhodope Belt (Chalkidhiki Peninsula and Thrace region, NE Greece)

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ABSTRACT

The field relationships, biostratigraphic constraints and paleoenvironmental conditions of lowermost Cretaceous platform carbonates from the eastern part of the Vardar Zone and the Circum-Rhodope Belt are studied. Field data confirm the unconformable position of non-deformed and non-metamorphosed limestones over Upper Jurassic back-arc rift-spreading ridge Sithonia ophiolites of the Vardar Zone in the Chalikidiki Peninsula and deformed arc-related greenschists of the Circum-Rhodope Belt in Thrace region. The distinguished microfossil assemblages and foraminiferal morphogroups are compatible with deposition in a shallow-water environment adjacent to the continental margin of Eurasia. The morphogroup characteristics support such interpretation and newly discovered microfossils define the age of the limestones as Berriasian to early Valanginian. The microfossil data conform to available radiometric ages for the Late Jurassic ophiolite crystallization and time equivalent Circum-Rhodope Belt thrust tectonics. Hence, the obtained results provide sedimentary evidence for pre-Berriasian accretion of the eastern Vardar Zone ophiolites to the continental margin and completion of the Circum-Rhodope Belt tectono-metamorphic history. The earliest Cretaceous sedimentation extended along the whole length of the Circum-Rhodope Belt across the north Aegean region implying a region-wide development of a carbonate platform which postdated the imprint of an important tectonic event. The sedimentation seals the Late Jurassic-Early Cretaceous Balkan orogenic event in the internal Hellenides at the Eurasian plate margin. This conclusion has strong implications for the geodynamic evolution of the Alpine Belt of the North Aegean region.

1. Introduction

Autochthonous sedimentary rocks upon oceanic crust are a powerful tool to constrain important aspects of supra-subduction zone ophiolite evolution such as igneous accretion and emplacement via obduction process onto the continental margin through arc-margin collision, together with related tectono-metamorphic history and timing of orogeny. The Alpine orogen in the north Aegean region amalgamates various tectonic units linked to the complex subduction-accretion and collisional Mesozoic–Cenozoic geodynamic evolution of the Neotethyan Vardar Ocean (e.g. Robertson and Dixon, 1984; Robertson et al., 1996; Ricou et al., 1998; Stampfli, 2000; Stampfli and Hochard, 2009), now represented by the Vardar Suture Zone. The Vardar Zone (Kossmat, 1924) through the Circum-Rhodope Belt (Kauffmann et al., 1976) limits from the south the Serbo-Macedonian and Rhodope high-grade crystalline massifs or terranes in the Chalikidiki Peninsula of North Greece (Fig. 1). There, the Circum-Rhodope Belt constitutes the easternmost part of the Vardar Zone (i.e. Peonias Subzone, Mercier, 1966a; Ferrière and Stais, 1995; Ferrière et al., 2012), or represents a separate unit (Kauffmann et al., 1976; Papanikolaou, 2009, 2013) that extends further northeast in the mainland of Northern Greece and Southern Bulgaria.

In the Chalkidiki Peninsula, the Upper Jurassic to Lower Cretaceous carbonate rocks outcropping in the Kassandra and Sithonia branches, Kelifos Island and the western part of the peninsula cover

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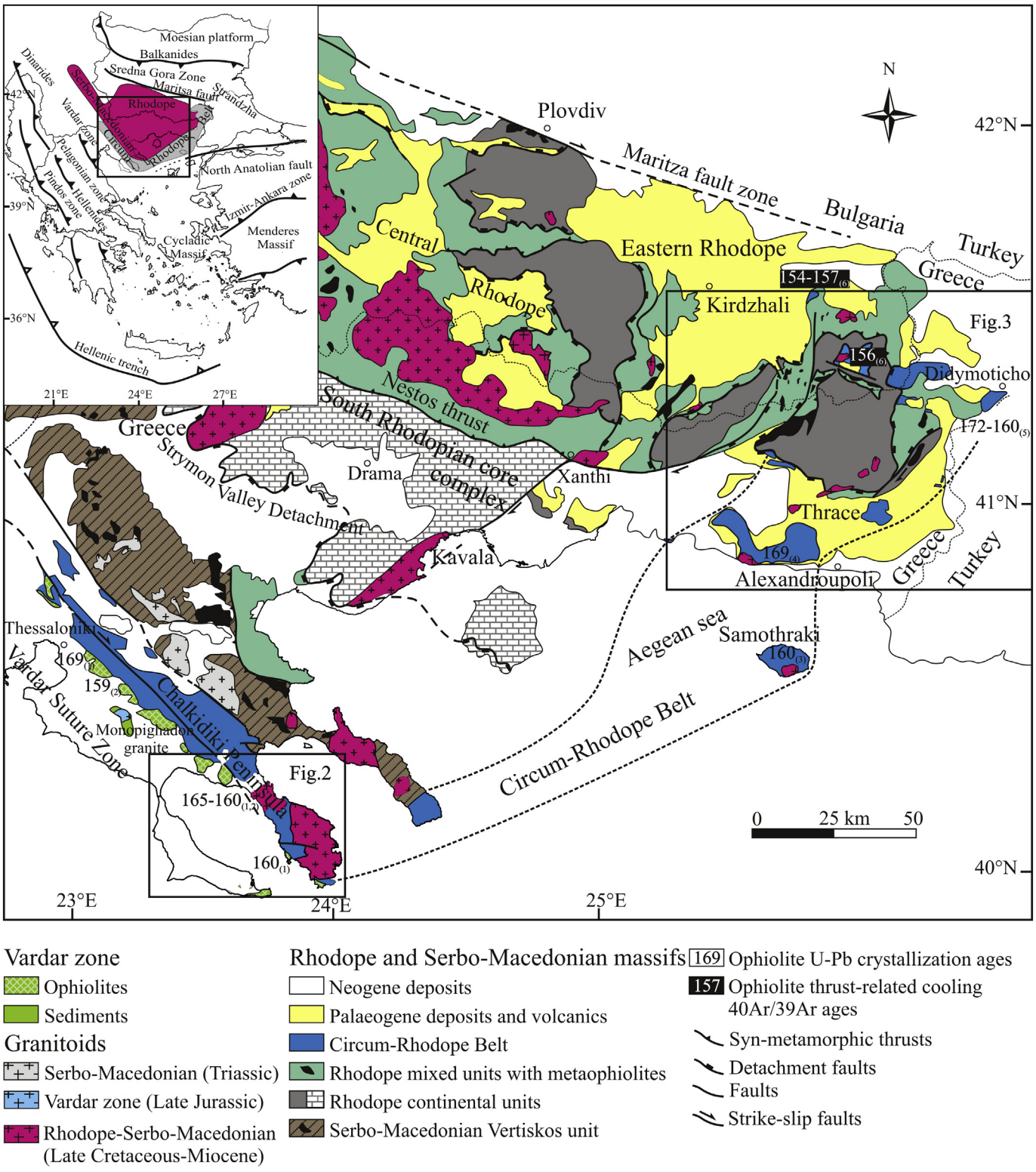

Fig. 1. Tectonic map of Southern Bulgaria and Northern Greece (adapted from Bonev et al., 2013). Inset: Tectonic framework of the Alpine Belt in the Aegean region. Note: Figs. 2 and 3 are outlined with boxes. Geochronology: 1, Zachariadis et al., 2006 U–Pb SHRIMP zircon; 2, Zachariadis, 2007 U–Pb SHRIMP zircon; 3, Koglin, 2008 U–Pb SHRIMP zircon; 4, Koglin et al., 2007 U–Pb SHRIMP zircon; 5, Bonev et al., 2012, U–Pb LA-ICP-MS zircon; 6, Bonev et al., 2010b 39Ar/40Ar white mica.

exposed ophiolites along the eastern Vardar Zone-western Circum-Rhodope Belt transect (Kockel et al., 1977; Jung and Mussallam, 1985; Mussallam and Jung, 1986; Michard et al., 1998) (Figs. 1, 2). Similar carbonate rocks overlying granodiorites and reaching Aptian biostratigraphic level were identified in boreholes in the vicinity of Epanomi town (south of Thessaloniki) below Cenozoic deposits (Carras and Georgala, 1998). In the western Chalkidiki Peninsula, the biostratigraphically dated Kimmeridgian-Tithonian Petralona Limestones locally cover in transgressive manner the Monopighadon granite (Kockel et al., 1977), which is dated as